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MATERIALS

FOR A

FLORA OF THE MALAYAN PENINSULA

BY

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No. 14.

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Materials for a Flora of the Malayan Peninsula.—By SIR GEORGE KING,
K.C.I.E., LL.D., F.R.S., *late Superintendent of the Royal Botanic*
Garden, Calcutta, and J. SYKES GAMBLE, C.I.E., F.R.S., late of the
Indian Forest Department.

No. 14.

The present contribution contains an account by Mr. Gamble of the few species belonging to the Natural Order *Caprifoliaceæ*, which have so far been collected in the Malay Peninsula and adjacent Islands. But the larger part of it is occupied by a joint account by the authors of the species of the Order *Rubiaceæ*, which are characterised by having more ovules than one in each cell of the ovary. The key which precedes the text is only for these genera. In a paper which the authors hope soon to submit to the Society they will deal with the species of the genera which have only a single ovule in each ovarian cell; and that paper will, in like manner, be preceded by a key to these uniovular genera.

With the exception of the important family of *Leguminosæ*, which was elaborated entirely by Major D. Prain, of the Botanic Garden, Calcutta, and of one genus of *Melastomaceæ*, which was done in conjunction with Dr. O. Stapf, chief assistant in the Kew Herbarium, the whole of the orders dealt with in the preceding thirteen parts of these *Materials* have been worked out by Sir George King. With the view of expedit-

ing the completion of the series, and in consideration of the liberality of the Government of the Straits Settlements which has made feasible a more rapid rate of publication, it has been arranged that Mr. J. S. Gamble will henceforth, in the majority of the orders belonging to *Corollifloræ* and *Incompletæ*, work in collaboration with Sir George King; while certain orders will be worked out independently by botanical friends, who have kindly promised their aid.

Order LVIII. CAPRIFOLIACEÆ.

Small trees or shrubs, erect or climbing, rarely herbs. *Leaves* opposite, rarely alternate, simple, lobed or imparipinnate; stipules usually absent. *Inflorescence* various, usually cymose; flowers hermaphrodite, regular or irregular. *Calyx* adnate to the ovary; lobes 5, superior, usually imbricate, rarely valvate. *Corolla* superior, gamopetalous, tubular, funnel-shaped or rotate; limb 5-fid, lobes imbricate. *Stamens* 5, rarely 4, inserted on the corolla-tube, alternate with the lobes; filaments filiform or subulate; anthers 2-celled, introrse, longitudinally dehiscent. *Ovary* inferior, 2-6-, rarely 1-celled; style terminal, stigma capitate, undivided or bifid, sometimes short and 3-lobed; ovules sometimes solitary, pendulous, sometimes many, biseriate, anatropous. *Fruit* a berry or drupe or sometimes dry and indehiscent, many-celled, 1- to many-seeded. *Seeds* single or many in each cell; testa crustaceous or hard; albumen fleshy, copious; embryo usually minute, ovoid or clavate, 2-fid, radicle smooth, cotyledons ovate.—*DISTRIB.* Genera 13, species 200 to 220; chiefly found in the Northern Hemisphere more especially in temperate regions; a few in Australia and South America; none in tropical or Southern Africa.

s serrate, JM, Linn.

Shrubs or small trees. *Leaves* opposite, rarely alternately verticillate, simple, petiolate; entire, serrate or dentate, sometimes palmately lobed; sometimes stellately pubescent, sometimes gland-dotted; stipules usually inconspicuous or absent, in a few cases very large. *Flowers* hermaphrodite, in terminal or subterminal subumbellate corymbs, the branches cymose or paniced; bracts few, small; bracteoles 1 to 2, usually very small, generally quickly deciduous. *Calyx-tube* turbinate, cylindric or clavate; limb short, 5-toothed, persistent. *Corolla* white, pink or yellowish; rotate, campanulate or tubular; lobes 5, equal, imbricate. *Stamens* 5, inserted on the corolla, alternate with the lobes; anthers oblong, usually exserted; filaments linear or subulate. *Ovary* 1-3-celled; style short, conical, stigma small, obscurely 3-lobed; ovules solitary in the cells, pendulous. *Fruit* a drupe 1- or rarely 2-3-celled, 1-seeded; endocarp tough, papery or crustaceous. *Seed* oblong, com-

pressed, grooved, the edges sometimes incurved; testa membranaceous; albumen fleshy, sometimes ruminant; embryo minute, cotyledons thin.—
DISTRIB. Species over 80, chiefly of the temperate and sub-temperate regions of the Northern Hemisphere in Europe and Asia; a few in the West Indies, South America and Madagascar.

Leaves entire:—

Corolla rotate; filaments long, linear; calyx-tube pubescent 1. *V. sambucinum*.

Corolla tubular; filaments short, subulate; calyx-tube glabrous 2. *V. Beccarii*.

Leaves dentate or serrate; calyx-tube glabrous 3. *V. lutescens*.

1. *VIBERNUM SAMBUCINUM*, Reinw.; Blume Bijdr. 656. A large shrub or small tree up to 30 feet high; young branches stout, smooth, somewhat angled; youngest parts and branches of the inflorescence brown, stellate-pubescent. *Leaves* opposite, entire, thinly coriaceous, elliptic-oblong or -lanceolate, abruptly acuminate, the base cuneate; both surfaces glabrous except for a few hairs on the midrib beneath and occasional tufts in the axils of the main-nerves; main-nerves 4-6 pairs, prominent, curved upwards, joined by prominent arches near the margin, lesser nerves reticulate; length 5 to 10 in., breadth 1.5 to 4 in., petiole .75 to 1.25 in., pilose especially on the inner surface. *Corymb* terminal, usually peduncled but sometimes nearly sessile, umbellate, primary branches 6 to 8 and .5 to 1 in. long, upper cymosely branched, short in flower, longer in fruit; bracts of primary branches very early deciduous, linear-spathulate, .2 to .3 in. long, bracteoles also very deciduous, very short, linear-oblong, densely brown stellate-pubescent. *Calyx*-tube cylindric, .05 in. long, pubescent; lobes reading, lanceolate-
Corolla hemispheric in bud, rotate when open; lobes 5, round, imbricate, yellow-white. *Stamens* 5; anthers oblong, exserted; filament longer than the petals, much folded in bud. *Ovary* 1-celled, style conical. *Fruit* a drupe, broadly ovate, suddenly acute, compressed wrinkled, 2-grooved on one and 3-grooved on the other face, .35 in. long, .2 in. broad, endocarp thick, osseous. DC. Prodr. IV. 325; Miq. Fl. Ind. Bat. II. (1856) 120; Oersted in Vidensk. Meddel. (1860) 299, t. 7, figs. 11-13; C. B. Clarke in Hook. fil. Fl. Br. Ind. III. 5; Koord. & Val. Boomsoort. Java in Mededeel. 's Lands Plant. XXXIII. (1900) 40. *V. integerrimum*, Wall. Cat. 457; DC. Prodr. IV. 324; Hook. fil. and Th. in Journ. Linn. Soc. II. 476. *Premna* (?), Wall. Cat. 9077.

PERAK: Wray 1237, 1483, 2951; Scortechini 514. PENANG: Wall. 457; Walker 92, 272; Maingay (K.D.) 712/2; King's Collector 1586, 2273, 5202; Curtis 278. MALACCA: Griffith 3395. SINGAPORE: Ridley 6335. DISTRIB. Sumatra; Java; Borneo.

The Perak specimens show two forms, the one (No. 1483 *Wray*) with leaves elliptic-oblong, glabrous beneath; the other (No. 2951 *Wray*) with smaller leaves elliptic-lanceolate, with occasional stellate hairs beneath. Other specimens from various localities show intermediate forms so that they are not constant varieties.

2. *VIBURNUM BECCARII*, Gamble n. sp. Apparently a small tree, young branches rather thick, smooth. *Leaves* opposite, entire, coriaceous, ovate, obtuse or very shortly and bluntly acute, base cuneate; glabrous above, minutely glandular-dotted beneath; main-nerves 4 to 6 pairs, smaller nerves reticulate; length 3 to 5 in., breadth 2 to 3 in., petiole .75 to 1.25 in. *Corymb* terminal, long-peduncled (1.5 to 3 in.), umbellate, main branches 6 to 8, upper branches cymose, all brown stellate-pubescent when young; bracts and bracteoles small, linear, very numerous, rusty stellate-pubescent, very quickly deciduous. *Calyx*-tube clavate, glabrous, .1 in. long; teeth very minute. *Corolla* tubular, ovoid in bud, .15 in. long; teeth 5, acute. *Stamens* 5; anthers oblong, pendulous from the summit of a subulate thickened filament, .075 in. long. *Ovary* 1-celled; style short, conical. *Fruit* (young only) a drupe, 1-celled, faintly 1-grooved on one face, 2-grooved on the other.

PERAK: *Scortechini* 375b. *DISTRIB.* Sumatra (*Beccari* No. 194 on Mt. Singalan in Herb. Kew).

Specimens of the fully opened corolla or of the mature fruit are not yet available.

3. *VIBURNUM LUTESCENS*, Blume Bijdr. 655 (1825). A small tree, young branches slender, smooth, youngest parts and branches of the inflorescences brown, stellate-pubescent. *Leaves* opposite, ovate-acuminate, thinly coriaceous, cuneate at base, upper two-thirds deeply serrate-dentate, sometimes entire, teeth mucronate, lower one-third entire; both surfaces glabrous. Main-nerves 4 to 8 pairs, ascending, prominent, lesser nerves reticulate; length 3 to 5 in., breadth 1.5 to .5 in., petiole .5 to .75, rough when dry. *Corymb* terminal, long-peduncled (1.5 to 2.5 in.), umbellate, primary branches 3 to 6 and .5 to .75 in. long, paniculate-cymosely branched above; bracts of primary branches deciduous, linear-spathulate, .4 to .5 in. long, bracteoles very minute, ovate-acuminate, both stellately brown-pubescent. *Calyx*-tube angular, glabrous, .05 in. long; lobes 5, erect, ovate, bluntly acute. *Corolla* hemispheric in bud, rotate-campanulate when open; lobes 5, rounded, imbricate, white. *Stamens* 5; anthers oblong, exserted; filaments short, equal to the petals. *Ovary* 1-celled; style short, conical, faintly 3-lobed. *Fruit* a drupe, oblong-ellipsoid, abruptly apiculate, compressed, 1-grooved on one and 2-grooved on the other face, .3 to .4 in. long, .2 in. broad; endocarp thick, hard. DC. Prodr. IV. 325, *V. nogynum*, Blume Bijdr. 655; DC. Prodr. IV. 327. *V. sundaicum*,

Miq. Fl. Ind. Bat. II. (1856) 121; Koord. & Val. Boomsoort. Java in Mededeel. 'sLands Plant. XXXIII. (1900) 43.

PERAK: Wray 1496, at 4900 feet on Ulu Batang Padang. DISTRIB. Sumatra; Java.

Nat. Ord. LIX. RUBIACEÆ.

Trees, shrubs or herbs, erect, climbing, twining or prostrate, unarmed or spinous. *Leaves* simple, opposite, usually quite entire; stipules inter- or intra-petiolar, free or united to each other or to the petiole; in the tribe *Galiæ* leaf-like and forming a whorl with the leaves. *Inflorescence* various. *Flowers* usually hermaphrodite, mostly regular and symmetrical. *Calyx-tube* adnate to the ovary: its limb various, sometimes petaloid. *Corolla* gamopetalous, regular, usually 4-5-lobed, rarely bilabiate; the lobes of the limb valvate, imbricate or contorted. *Stamens* equal in number to the lobes of the corolla, sessile or on short or long filaments; *anthers* 2-celled, usually linear, dorsifixed, and dehiscing longitudinally, rarely with porous dehiscence. *Disk* epigynous, usually annular or cushion-shaped, sometimes lobed, or reduced to glands. *Ovary* inferior, 1-10-celled; style simple or cleft (but rarely cleft to the base); stigmas various, usually on the style-arms, but sometimes connate and fusiform, oblong, capitate or mitriform and simple or lobed. *Ovules* in the ovarian cells solitary or in pairs, or numerous. *Fruit* capsular, baccate, drupe-like, 2-10-celled, or dehiscing into 2 or more dehiscent or indehiscent cocci. *Seeds* various, with horny albumen; embryo straight or curved; cotyledons flat or semi-terete; radicle superior or inferior.—DISTRIB. About 4,800 species, chiefly tropical and sub-tropical.

Ovules numerous in each cell of the ovary:—

Fruit dry, capsular or separating into 2 or 4 cocci:—

Flowers collected into dense globular heads: corolla funnel-shaped, its lobes valvate or imbricate in bud : stigma simple:—

- | | | | |
|----------------------------------|-----|-----|-------------------|
| Lobes of the corolla valvate | ... | ... | 1. MITRAGYNE. |
| Lobes of the corolla imbricate:— | | | |
| Tubes of the calyces concrete | ... | ... | 2. SARCOCEPHALUS. |
| Tubes of the calyces free:— | | | |
| Seeds not winged | ... | ... | 3. ANTHOCEPHALUS. |
| Seeds winged:— | | | |

Trees:—

- | | | | |
|---------------------------|-----|-----|-------------|
| Capitules solitary or few | ... | ... | 4. NAUCLEA. |
| Capitules numerous, small | ... | ... | 5. ADINA. |

Climbers:—

- | | | | |
|---|-----|-----|-------------|
| Capitules usually solitary, axillary, on peduncles curving into hooks when in fruit | ... | ... | 6. UNCARIA. |
|---|-----|-----|-------------|

Flowers in corymbs or panicles, not in globular heads; corolla-lobes valvate, imbricate or contorted in bud. Fruit capsular, 2-celled, seeds winged:—

Corolla funnel-shaped, its lobes twisted in bud; flowers in terminal pendulous panicles; lobes of calyx equal, not petaloid: stigma simple fusiform...

7. COPTORAPELTA.

Corolla with a short tube, its lobes slightly twisted in bud; flowers stalked, in erect corymbs or panicles; one of the lobes of the calyx sometimes large, petaloid and persistent; stigma fleshy, 2-lobed ...

8. MUSSAENDOPSIS.

Flowers in subscorpioid cymes: corolla funnel-shaped, its lobes valvate, but somewhat twisted in bud; capsule 2-celled; seeds numerous, obscurely winged; stigmas 2 linear, revolute ...

9. GREENIA.

Corolla and inflorescence various, corolla-lobes valvate in bud. Stamens 4 or 5. Fruit a loculi- or septi- cidal capsule with 2 or 4 cells, or consisting of 2 or 4 adnate dry dehiscent or indehiscent (rarely quite indehiscent) cocci; seeds small or minute, rarely winged. Herbs or small shrubs (never trees) with entire leaves:—

Fruit 2-celled, usually indehiscent: stipules entire:—

Corolla funnel-shaped, 4- or 5-toothed; anthers included, dehiscing longitudinally ...

10. DENTELLA.

Corolla rotate; anthers large, exserted, connivent, dehiscing by apical pores ...

11. ARGOSTEMMA.

Fruit oblong, sub-globose, or orbicular, 2- rarely 4- celled, usually dehiscent, many-seeded, rarely 1- seeded: stipules often divided into bristles:—

Corolla funnel-shaped or campanulate, 4-lobed; capsule loculi- or septi- cidal, rarely indehiscent; calyx-teeth contiguous; seeds usually angular ...

12. HEDYOTIS.

Corolla rotate, funnel- or salver-shaped, 4- rarely 5-lobed; capsule loculicidal above the remote calyx-teeth, rarely indehiscent; seeds minute, angular ...

13. OLDENLANDIA.

Fruit broadly and didymously obcordate, compressed, composed of 2 spreading lobes, loculicidal above the calyx; flowers secund on the branches of dichotomous cymes ...

14. OPHIOREHIZA.

Fruit fleshy, dehiscing irregularly or at the apex, or drupe-like and separating into 2 or more many-seeded cocci:—

Flowers in capitula:—

Capitula without involucre: calyx entire: stamens 4 ...

15. LUCINAEA.

Capitula involucre; calyx obliquely campanulate, obtusely 2-4-lobed or 2-lipped: stamens 5; climbing shrubs ...

16. LECANANTHUS.

- Capitula bracteate, crowded; calyx with 5 ciliate lobes; corolla 5-lobed; stamens 5; arms of style 2, truncate; berry with thin pericarp; herbaceous 17. *COPTOPHYLLUM*.
- Flowers in terminal corymbs or racemes: one of the calyx-lobes occasionally long, petaloid, persistent; erect or scandent shrubs ... 18. *MUSSAENDA*.
- Flowers in paniced terminal umbels; calyx-limb cupular, deciduous; corolla 5-lobed; stamens 5; arms of style linear-lanceolate; woody scandent shrubs ... 19. *TRISCIADIA*.
- Flowers in axillary cymes; shrubs or small trees:—
- Flowers polygamous; cymes paniced; lobes of calyx and corolla and the stamens 8 to 16; disc large, convex, with as many lobes as the stamens and stigma ... 20. *AULACODISCUS*.
- Flowers hermaphrodite:—
- Cymes short, few-flowered; calyx minutely toothed; fruit with scanty pulp ... 21. *UROPHYLLUM*.
- Cymes loose; flowers 4-5-merous; lobes of corolla reduplicate-valvate; fruit baccate, fleshy, 2-5 celled ... 22. *ADENOSACME*.
- Corolla-lobes twisted in bud: fruit baccate, fleshy or dry; seeds usually large, cotyledons often foliaceous:—
- Seeds numerous in each cell of the fruit:—
- Flowers dioecious:—
- Cymes from the axils of fallen or undeveloped leaves; style arms 2; berries with thin pericarp, ellipsoid or globular ... 23. *BRACHYTOME*.
- Flowers hermaphrodite:—
- Flowers in cymes:—
- Cymes terminal, corymbose; flowers 5-merous; stigma simple, fusiform; fruit pisiform, 2-celled ... 24. *STYLOCORYNA*.
- Cymes usually axillary; stigma fusiform or bifid; fruit baccate with thick pericarp:—
- Calyx-limb various; fruit 2-celled ... 25. *RANDIA*.
- Calyx-limb usually tubular; fruit 1-celled ... 26. *GARDENIA*.
- Flowers in spikes:—
- Calyx-limb minutely 5-toothed: anthers thickened at the apex ... 27. *PETUNGA*.
- Ovules and seeds 2 or 3 in each cell:—
- Flowers in axillary fascicles on small cymes; calyx-limb truncate or 4-5-toothed; fruit baccate, ovoid or globose, sessile ... 28. *DIPLOSPORA*.
- Ovules never more than 2 in each cell of the two-celled ovary:—
- Corolla-lobes twisted; ovules inserted together halfway up the ovarian cell, one pendulous, the other erect; flowers in dense axillary pedunculate cymes: a small littoral tree ... 29. *SCYPHIHORA*.

Corolla-lobes valvate; ovules erect, on the top of an erect basilar placenta; flowers in scorpioid cymes, collected in corymbose panicles ... 30. JACKIA.

1. MITRAGYNA, Korthals.

Trees with petiolate leaves and large caducous bracts and stipules. *Flowers* sessile, crowded in globose, solitary or paniculate, pedunculate capitules, each peduncle with 2 foliaceous long-petioled bracts near its apex: the flowers mixed in the capitules with numerous, spatulate paleaceous bracteoles. *Calyces* conoid, densely crowded, but quite separable from each other: the calyx-tube short, its mouth truncate or 5-toothed. *Corolla* funnel-shaped; the tube long, the mouth with a ring of villose hairs inside below the base of the lobes; lobes 5, thickened towards the apex, lanceolate, valvate in aestivation. *Stamens* 5, originating just above the ring of hairs; *anthers* lanceolate, apiculate, cordate or sagittate at the base; filaments short. *Ovary* 2-celled; *style* filiform, exserted; *stigma* cylindric or mitriform, its base overlapping the apex of the style; *ovules* numerous, on pendulous placentas. *Fruit* of two 5-ridged cocci dehiscing at the apex. *Seeds* numerous, small; the testa with thin wings, the albumen fleshy.—*DISTRIB.* Eight species, 5 of which are Indo-Malayan and 3 tropical African.

Main-nerves of leaves 7 to 9 pairs; corolla .2 in. long;

calyx-tube narrow, not ridged ... 1. *M. diversifolia*.

Main-nerves of leaves 12 to 15 pairs; corolla .3 in.

long; calyx-tube wide, ridged ... 2. *M. speciosa*.

1. MITRAGYNA DIVERSIFOLIA, Haviland in Journ. Linn. Soc. XXXIII.
71. Young branches pale, compressed. *Leaves* thickly membranous, ovate or elliptic, to rotund-ovate; obtuse or sub-acute; the base rounded (in the lower leaves slightly cordate); both surfaces glabrous, the lower minutely reticulate, sometimes puberulous especially on the nerves; main-nerves 7 to 9 pairs, rather straight, spreading; length 4 to 8 in.; breadth 2 to 6 in.; petiole .35 to 1.25 in.; *stipules* oblong, blunt. *Corolla* .2 in. long; tube of *calyx* not ridged, about .025 in. wide. *Anthers* cordate at the base. *Stigma* cylindric, overlapping the apex of the style by its hollow base. *Mitragyne javanica*, Koord. & Valet. Bijdr. 8, 38. *Stephegyne diversifolia*, Hook. fl. Fl. Br. Ind. III. 26. *S. parvifolia*, Korth. Verh. Nat. Gesch., p. 161 (*in part*). *Nauclea diversifolia*, Wall. Cat. 6096: G. Don Gen. Syst. III. 467. *N. rotundifolia*, Roxb. Fl. Ind. I. 516; Kurz For. Fl. Burm. II. 67. *N. Brunonis*, Wall. Cat. 6097: G. Don, l.c. *N. parvifolia*, Roxb. var. 2, Kurz For. Fl. Burm. II. 67.

ANDAMAN ISLANDS.—*DISTRIB.* Burma; Chittagong; Philippines.

The occurrence of this in a wild state in the Malay Peninsula is doubtful. In the Andaman islands it is common.

The stigma of this is externally almost cylindrical. But it is hollowed at the base like a wine-bottle and covers the apex of the style like a cap. The leaves of the upper part of the branches are smaller and more or less ovoid in form; those of the lower parts are larger and more rotund, hence the specific name. Roxburgh, thinking only of the lower leaves, named the species *Nauclea rotundifolia*.

2. MITRAGYNA SPECIOSA, Korth. Obs. de Naucleés Indicés, p. 19 (name only). Young branches usually dark-coloured, compressed. Leaves membranous, oblong-obovate to oblong, shortly and abruptly acuminate or sub-acute, the base broad and rounded or rarely slightly and suddenly contracted; both surfaces glabrous, the lower minutely reticulate and sometimes puberulous on the 12 to 15 pairs of slightly curved ascending nerves; length 4 to 5·5 in.; breadth 2 to 3·5 in.; petiole thin, ·8 to 1·2 in. long; stipules lanceolate, sparsely pubescent. Corolla ·3 in. long; tube of calyx wide, ridged, its mouth about ·075 in. across. Anthers sagittate at the base. Stigma mitriform. Haviland in Journ. Linn. Soc. XXXIII. 69. *Stephegyne speciosa*, Korth. Verh. Nat. Gesch. Bot., p. 160. *S. parvifolia*, K. Schum. Fl. Kaiser-Wilh. Land., p. 127. *Nauclea speciosa*, Miq. Fl. Ind. Bat. II. 140.

PAHANG: Ridley 2190. PERAK: Wray 1896, 4280; PERAK: Scortechini 616; King's Collector 1770, 10021, 10459.—DISTRIB. Sumatra, Forbes, Borneo; Molley 1169; Korthals, Philippines; Cuming; Motley; Vidal; New Guinea.

2. SARCOCEPHALUS, Afzel.

Shrubs or trees with petiolate leaves and small or large caducous or persistent stipules. Flowers sessile, conjoined by their confluent calyx-tubes into globose, axillary or terminal, pedunculate, ebracteolate heads, the peduncles with 2 small bracts near or below the middle. Calyx-tube short; its mouth with 4 or 5 imbricate, persistent or caducous teeth. Corolla infundibuliform; its mouth with 4 or 5 broad, blunt, imbricate teeth not thickened near the apex. Stamens 4 or 5, inserted in the glabrous throat of the corolla by very short filaments, or sessile; anthers broadly ovate. Stigma clavate, fusiform or capitate, exserted, the style long, filiform. Ovary 2-celled; ovules numerous, on two pendulous placentas. Fruits combined into a globose fleshy mass of 2-celled pyrenes, with thin septa. Seeds ovoid, compressed, not winged; testa crustaceous; albumen fleshy.—DISTRIB. About a dozen species, mostly Indo-Malayan; one Australian and one African.

Leaves pubescent beneath: capitules about ·8 in. in
diam.

1. *S. hirsutus*.

Leaves minutely scaly beneath, more or less obovate;
capitules 1·5 in. in diam. ... 2. *S. Maingayi*.

Leaves quite glabrous:—

Leaves oblong-lanceolate to elliptic-oblong; capi-
tules ·5 to ·75 in. in diam. ... 3. *S. subditus*.

Leaves more or less obovate; capitules ·5 in. in
diam. ... 4. *S. Junghuhnii*.

1. *SARCOCEPHALUS HIRSUTUS*, Havil. in Journ. Linn. Soc. XXXIII.

32. A tree: young branches slender, pubescent, the bark pale. *Leaves* thickly membranous, oblong-oblancoate, shortly and abruptly acuminate, the base attenuate: upper surface quite glabrous, shining, the lower with short pubescence on the nerves and midrib, otherwise minutely scaly; main-nerves 7 to 9 pairs, ascending, slightly prominent on the lower surface; length 3 to 5 in.; breadth 1·5 to 2·25 in. petiole ·2 to ·3 in., pubescent; *stipules* oblong-oblancoate, obtuse, ·3 in. long. *Peduncle* solitary, terminal, about 1 in. long, with 2 lanceolate small bracts about the middle. *Capitules* about ·8 in. in diam. *Calyx* very short; the limb truncate, hairy. *Corolla* infundibuliform, glabrous both outside and inside; the mouth with 4 rarely 5 broad rotund slightly obovate lobes. *Anthers* 4, broadly ovate not apiculate, cordate at the base, inserted at the base of the corolla-lobes by short broad filaments; numerous flattened and ridged imperfect flowers mixed with the perfect ones. *Style* shortly exserted, *stigma* cylindric.

MALACCA: *Ridley* 3214.—DISTRIB. Borneo.

The Malacca specimens described above have their leaves more attenuate at the base and rather more hairy beneath than the Bornean type (Herb. Hav. 3406) on which Haviland founded the species. But in other respects they agree.

2. *SARCOCEPHALUS MAINGAYI*, Havil. in Journ. Linn. Soc. XXXIII.

33. A spreading tree, 40 to 80 feet high; young branches rather stout, yellowish-brown, glabrous. *Leaves* coriaceous, broadly elliptic or elliptic-obovate, shortly and abruptly acuminate, the base attenuate; upper surface quite glabrous, shining; the lower covered with minute white scales: main-nerves 9 to 14 pairs, impressed on the upper surface, prominent and sparsely puberulous on the lower; length 4 to 8 in.; breadth 2·25 to 3·5 in.; petiole ·5 to ·75 in., slightly winged; *stipules* oblong, sub-acute, thick, conjoined at the base, ·65 in. long. *Peduncles* solitary, terminal, short (·25 to ·5 in. long) bearing several oblong or lanceolate bracts, about ·5 in. in length. *Capitule* 1·5 in. in diam. *Calyx*-tube tomentose, 4-5-lobed. *Corolla* ·3 in. long, infundibuliform; the tube sub-glabrous; the lobes 4 or 5, lanceolate, pubescent on both surfaces. *Anthers* oblong, sub-acute, apiculate, filaments very short. *Style* exserted; *stigma* large, overlapping at its base the apex of the style. *Nauclea Maingayi*, Hook. fil. Fl. Br. Ind. II, 27.

MALACCA: *Maingay* (K.D.) 823. PERAK: *King's Collector* 4470, 4771, 6424, 7768, 7977, 10020, 10363; *Wray* 2043, 4173; *Scortechini* 265. SELANGOR: *Ridley* 2851. PROVINCE WELLESLEY: *Ridley* 9388.

3. *SARCOCEPHALUS SUBDITUS*, Miq. Fl. Ind. Bat. II. 133. A shrub or small tree; young branches slender, pale, the very youngest dark-coloured, glabrous. *Leaves* dark-coloured (when dry), thickly membranous, glabrous, oblong-oblong to elliptic-oblong, shortly and obtusely acuminate, the base cuneate; main-nerves 6 or 7 pairs, spreading; length 3 to 4·5 in.; breadth 1·25 to 2·5 in.; petiole ·2 to ·4 in. *Peduncles* usually solitary, slender, axillary or terminal, less than 1 in. long when in flower, longer in fruit, glabrescent or puberulous; bearing two small lanceolate bracts below the middle. *Capitules* ·5 to ·75 in. in diam. *Calyx-tube* short; the mouth expanded, truncate. *Corolla* with a narrow cylindrical tube; the mouth expanded into 4 broadly oblong or sub-obovate, obtuse lobes, slightly hairy on the inner surface; *anthers* ovate, almost sessile; *style* exserted, stigma clavate. *Syncarpium* globular, ·5 to ·75 in. in diam.; pale, covered with striate pits. *Seeds* black. Hook. fil. Fl. Br. Ind. II. 22; Havil. in Journ. Linn. Soc. XXXIII. 30; Koord. & Valet. Bijdr. 8, 16. *Platanocarpum subditum*; Korth. Verh. Nat. Gesch. 133, t. 32.

PERAK: *Scortechini*; *Wray* 4167; *King's Collector* 1073, 3027, 6646, 7812, 8854, 10436. SELANGOR: *Ridley* 10212. MALACCA: *Griffith* (K.D.) 1770, 2771.—DISTRIB. Sumatra; Borneo.

4. *SARCOCEPHALUS JUNGHUHNII*, Miq. Fl. Ind. Bat. II. 133. A tree, 40 or 50 feet high; young branches brown when dry. *Leaves* pale brown (when dry), thinly coriaceous, glabrous, elliptic to obovate-elliptic, abruptly, shortly and bluntly acuminate, the base more or less cuneate; main-nerves 5 to 7 pairs, curving upwards, prominent beneath; length 3·5 to 5·5 in.; breadth 1·65 to 3·5 in.; petiole ·35 to ·65 in. *Peduncles* axillary or terminal, solitary or in groups of three, from 1 to 1·5 in. long, with four small unequal, ovate-acute bracts below the middle, minutely pubescent. *Capitules* ·5 in. in diam. *Corolla* infundibuliform; its mouth with 4 large obovate-rotund blunt lobes, imbricate in aestivation, glabrous; *anthers* short, almost sessile, broadly ovate. *Style* exserted; *stigma* clavate. *Syncarpium* globular, covered with shallow striate pits. *Seeds* black. Hook. fil. Fl. Br. Ind. III. 23; Havil. in Journ. Linn. Soc. XXXIII. 29.

MALACCA: *Griffith* (K.D.) 2772; *Maingay* (K.D.) 822; *Derry* 1110, 1188. SINGAPORE: *Ridley* 2847, 2850, 2880, 3397, 6534, 6897. PENANG: *Curtis* 303; *Fox* 10674. PERAK: *Scortechini* 2166, 2105; *King's Collector* 4440, 4499, 8179, 8315.—DISTRIB. Sumatra; Borneo; Philippines; Cochin-China.

3. ANTHOCEPHALUS, A. Rich.

Large glabrous trees with petiolate coriaceous leaves and large caducous stipules. *Flowers* sessile, crowded in solitary terminal globose pedunculate heads, the peduncles bracteate at the base: the capitules ebracteolate. *Calyx* with a narrow cylindric tube expanding above and divided into 5 linear-oblong sparsely pubescent persistent lobes. *Corolla* tubular below, infundibuliform above, with 5 deep linear lobes, glabrous. *Anthers* linear-oblong, the apex apiculate. *Style* long, exserted; stigma elongate, cylindric, slightly fusiform. *Ovary* 2-celled; placentas linear, attached to the middle of the septum; *ovules* numerous. *Seeds* minute, ellipsoid; testa sub-membranous, albumen fleshy.—DISTRIB. 2 species both Indo-Malayan.

ANTHOCEPHALUS INDICUS, A. Rich. in Mém. Soc. Hist. Nat. Paris, 1834, p. 237. A tall tree; young branches slender, dark-coloured. *Leaves* elliptic, elliptic-oblong or ovate; the apex acute; the base cuneate or rounded, sometimes sub-oblique; upper surface glabrous, the lower sometimes puberulous; main-nerves 10 to 12 pairs, spreading, slightly prominent on both surfaces; length 5.5 to 8 in.; breadth 2.5 to 3.5 in.; petiole 1.2 to 1.75 in., somewhat winged near the apex; stipules triangular. *Capitules* 1 to 2 in. in diam.: their peduncles 1.5 to 2 in. long. *Calyx* short, tubular below, infundibuliform above and deeply divided into 5 narrowly oblong lobes with obtuse, somewhat thickened apices, glabrous. *Corolla* elongate, infundibuliform, glabrous; the teeth broadly lanceolate, sub-acute. *Anthers* 5, linear-oblong, apiculate, the filaments short. *Style* long, exserted; stigma large, fusiform. *Fruit* 4-celled, with thin walls, the upper part containing 4 cartilaginous, indehiscent several-seeded pyrenes, the lower part only 2-celled and containing numerous seeds. *A. indicus*, Koord. & Valet. Bijdr. 8, p. 8. *A. morindæfolius*, Korth. Verh. Nat. Gesch. 154, t. 48; Miq. Fl. Ind. Bat. II. 135. *A. Cadamba*, Miq. Fl. Ind. Bat. II. 135; Bedd. Fl. Sylv. 127; t. 35; Brand. For. Fl. N.-W. Ind. 261; Hook. fil. Fl. Br. Ind. III. 23. *Nauclea Cadamba*, Roxb. Hort. Beng. 14; Fl. Ind. II. 512. *Sarcocephalus Cadamba*, Kurz. For. Fl. Burm. II. 63; Wall. Cat. 6088 (excl. sheet C).

PERAK: *King's Collector* 6913. ANDAMAN ISLANDS: *Prain's Collector* 43, 93.—DISTRIB. British India; Malayan Archipelago.

A perusal of Richard's original description of *Anth. indicus* convinces one that the shrub which he describes is not *Nauclea purpurea*, Roxb., as he says, but *Nauclea Cadamba* of the same author.

4. NAUCLEA, Linn.

Trees or shrubs with petiolate or sessile, coriaceous or sub-coriaceous leaves, often of rather large size; the stipules caducous or sub-

persistent, large. *Flowers* sessile, in solitary or ternate, pedunculate heads; the peduncles often thickened near the apex and bearing caducous bracts, often of large size, mostly caducous; the flowers mixed with bracteoles consisting of long thin stalks and conical hairy heads, or ebracteolate. *Calyx*-tubes closely adpressed; but not united with each other; the lobes 5, deciduous, filiform or spatulate, often thickened at the apex and hairy, valvate in aestivation. *Corolla* infundibuliform; the lobes 5, short, imbricate, the throat glabrous. *Stamens* 5; the anthers oblong or linear, included in the tube of the corolla; filaments very short. *Style* elongate, rather stout: *stigma* sub-globose or globose-ovoid. *Ovary* 2-celled, the placentas pendulous; ovules imbricate. *Fruit* of 2 cocci, often separating from the persistent axis, dehiscent. *Seeds* flattened; the testa with a wing, bifid at one end, acute at the other.—*DISTRIB.* About 30 species mostly tropical and Indo-Malayan.

- | | |
|---|-----------------------------|
| Lobes of corolla densely sericeous-strigose externally; | |
| peduncles solitary, short, each with 2 large sub- | |
| persistent bracts | 1. <i>N. Gageana</i> . |
| Lobes of corolla minutely glandular-puberulous exter- | |
| nally; bracts of peduncle deciduous, minute ... | 2. <i>N. synkorynes</i> . |
| Lobes of corolla glabrous or nearly so:— | |
| Capitule enveloped in two large sub-persistent | |
| bracts | 3. <i>N. purpurascens</i> . |
| Bracts near the base of the capitule, small, decid- | |
| uous | 4. <i>N. nicobarica</i> . |
| Bracts near the base of the peduncle, small, ternate, | |
| deciduous | 5. <i>N. peduncularis</i> . |

1. *NAUCLEA GAGEANA* King. n. sp. A tree; young branches rather stout, slightly compressed, when dry pale-brown. *Leaves* coriaceous, broadly ovate-elliptic (sub-rhomboidal) gradually narrowed to the obtuse apex, the base cuneate; both surfaces quite glabrous, the upper shining (when dry); the lower dull, reticulate; main-nerves 8 to 10 pairs, spreading, prominent on the lower surface: the midrib very bold; length 6 to 8 in.; breadth 3·5 to 4·5 in.; petiole ·6 to ·8 in., flattened, winged in its upper part. *Capitules* about 1·5 in. in diam., solitary or in pairs. *Peduncles* 1 in. long, with a pair of large (1·25 in. long) sub-persistent bracts above the middle. *Calyx* short, cylindric, densely sericeous; the mouth very short, with 5 broad truncate lobes. *Corolla* infundibuliform, ·4 to ·5 in. long, outside glabrous in its lower, sericeous-strigose in its upper part; inside glabrous; lobes of the mouth 5, ovate. *Style* exerted, glabrous; *stigma* ovoid. *Fruit* villous. *Bracteoles* of the capitulum fusiform, villous.

ANDAMAN ISLANDS: *King's Collector* 463, *Prain's Collector* 76.

A very distinct species named in honour of Captain Gage, Curator of the Calcutta Herbarium, who was the first to recognise it as a hitherto undescribed species.

2. *NAUCLEA SYNKORYNES*, Korthals Verh. Nat. Gesch. 160. A tree 30 to 40 feet high; young branches thin, compressed, broad at the nodes, pale-coloured (when dry). *Leaves* thinly coriaceous, oblong-ovate or oblong-obovate or narrowly elliptic, shortly rather abruptly acuminate, the base cuneate: both surfaces quite glabrous; main-nerves 7 or 8 pairs, rather straight, ascending, thin but prominent on the lower surface; length 3.5 to 5 in.; breadth 1.5 to 2.5 in.; petiole .25 to .4 in., slightly winged near the apex: stipules oblong-obovate, blunt, .5 in. long. *Peduncles* two or three together, erect, 1.5 to 2.5 in. long, dilated near the minutely bracteate apex. *Capitules* about 1 in. in diam. *Calyx*-tube short: its lobes long, partly deciduous; hirsute and sub-lanceolate in the lower persistent part, glabrous and clavate in the upper deciduous part. *Corolla* infundibuliform; the tube glabrous, .25 in. long: its lobes minutely glandular, pubescent outside, broadly ovate, blunt. *Anthers* reaching to the top of the tube, linear-oblong, shortly apiculate, the base sub-cordate. *Capsules* cuneiform, ridged, the apex villous, crowned by the calyx-limb. Havil. in Journ. Linn. Soc. XXXIII. 60.

PERAK: *King's Collector* 10276.—DISTRIB. Borneo.

3. *NAUCLEA PURPURASCENS*, Korth. Verh. Nat. Gesch. 158. A small tree, the young branches brown when dry, purple when fresh. *Leaves* thinly coriaceous, elliptic, elliptic-oblong, oblanceolate or oblong-ob lanceolate, acute or sub-acute, the base attenuate; both surfaces glabrous; main-nerves 7 to 9 pairs, rather straight, spreading, prominent on the lower surface, the midrib broad, length 4.5 to 8.5 in.; breadth 1.75 to 3 in.; petiole .35 to .75 in.; *stipules* ovate, acute, .75 in. long. *Capitules* 1.5 to 1.75 in. in diam., the peduncles 1.5 to 3 in. long, solitary or in threes, with 2 large boat-shaped sub-persistent bracts at the apex embracing the capitule. *Calyx*-tube short; the lobes 5, erect, linear, blunt, adpressed hairy. *Corolla* infundibuliform, glabrous; the lobes 5, short, broad, blunt, puberulous outside. *Anthers* 5, linear with a minute apical appendage; filaments shorter than the anthers. *Fruit* ribbed; the apex depressed, densely villous, the remains of the calyx-lobes short, hairy. Havil. in Journ. Linn. Soc. XXXIII. 58. Koord. & Valet. Bijdr. 8, p. 24. *N. Blancoi*, Vidal Phan. Cum. Phil. 175. *N. purpurea*, Blume Bijdr. 1008 (not of Roxb.).

SELANGOR: *Ridley* 7446. PAHANG: *Ridley* 2189. PERAK: *Scortechini* 112; *Ridley* 9721; *King's Collector* 8603, 10276, 10641; *Wray* 195. ANDAMANS AND NICOBARS: *Kurz*; *Prain's Collector*.—DISTRIB. Java; Borneo; Celebes; Philippines.

The large bracts which envelope the capitules in their younger stages are very characteristic of this species. It is closely allied to *N. peduncularis*, G. Don, as noted under that species.

4. *NAUCLEA NICOBARICA*, Havil. in Journ. Linn. Soc. XXXIII. 59. A tree; young branches slender, compressed, pale, smooth. *Leaves* thickly membranous, elliptic or obovate-elliptic, shortly and bluntly acuminate, the base cuneate, both surfaces glabrous; main-nerves 5 to 7 pairs, spreading, slightly curved, prominent on the lower surface, midrib very stout; length 3·5 to 7 in.; breadth 2 to 3·5 in.; petiole ·5 to ·8 in.; stipules shorter than the petiole, obovate-oblong, blunt. *Peduncles* usually in threes, rarely solitary, slightly compressed and thickened towards the bracteate, striate, adpressed hairy apex. *Calyx* with a short cylindric tube: the mouth with 5 broadly oblong, blunt lobes, pubescent. *Corolla* glabrous, ·35 in. long, infundibuliform; the lobes of the mouth 5, broadly oblong, blunt. *Anthers* 5, oblong, sagittate at the base, slightly apiculate at the apex, half exerted from the throat of the corolla; filaments more than half as long as the anthers. *Fruit* ridged, densely villous on the apex and covered by the white calyx-teeth. *N. purpurascens*, var. *latifolia*, Korth. (*vide* Haviland) Korth. ex Miq. Ann. Mus. Lugd. Bat. IV. 182.

NICOBAR ISLANDS: Kurz. ANDAMANS: Prain's Collector 83.

5. *NAUCLEA PEDUNCULARIS*, G. Don Syst. III. 469. A tree 40 to 60 feet high; young branches pale purplish-brown when dry. *Leaves* coriaceous, elliptic or elliptic-obovate, sub-acute, the base cuneate or rounded; upper surface quite glabrous, shining, the lower dull, minutely scaly when dry; main-nerves 9 to 11 pairs, ascending, very slightly curved; length 5 to 9 in.; breadth 2·5 to 4 in.; petiole ·4 to ·6 in. *Capitules* globose-ovoid, 1·25 to 1·5 in. broad; the peduncles usually in threes, sometimes solitary, slightly compressed, thickened at the apex; bracts near the base (*vide* Haviland) small, ternate, deciduous. *Calyx*-tube short, silky, the lobes 5 or 6, erect, ovate, acute or sub-acute. *Corolla* infundibuliform, the tube glabrous; lobes 5, ovate, glabrous, rarely puberulous outside. *Stamens* 5, inserted in the tube of the corolla: *anthers* linear-oblong, sagittate at the base, the apex with a broad membranous apiculus; filaments as long as the anthers. *Style* exerted: *stigma* short, ovoid. *Fruit* cuneiform, boldly ribbed, its apex depressed and slightly hairy. *Bracteoles* of the capitule with filiform stalks and double fusiform heads; the upper part of the head papillose and yellow; the lower covered with pale hair. Wall. Cat. 6091; Hook. fil. Fl. Br. Ind. III. 27; Havil. in Journ. Linn. Soc. XXXIII. 57.

PENANG: Porter; Curtis 1056, 3405. PERAK: Wray 2598, 3197; King's Collector 3404, 3578, 6424, 6761.—DISTRIB. Borneo, Beccari (P.B. 1890).

Very close to *N. purpurascens*, Korth., but the nerves of the leaves of this are more numerous, the bracts of the peduncles are much smaller; the apical appendage of the anthers is much longer and the filaments shorter.

5. ADINA, Salisb.

Trees or shrubs with petiolate sub-coriaceous or membranous leaves; the stipules small or large. *Flowers* sessile, in small bracteolate capitules. *Peduncles* in large or small panicles, or solitary, terminal or axillary. *Calyces* not concrete; the tube angled: lobes of the limb 5, short, persistent, or none. *Corolla* infundibuliform: the throat glabrous: lobes of the limb 5, imbricate or pseudo-valvate, the flowers mixed in the capitules with bracteoles. *Stamens* 5, on the mouth of the corolla; anthers short, oblong; filaments short. *Ovary* 2-celled; style thin, filiform, elongate; *stigma* clavate or capitate. *Ovules* numerous, imbricate on a pendulous placenta in each cell. *Fruit* 2-coccos, many-seeded. *Seeds* oblong, flat; testa winged; albumen fleshy.—*DISTRIB.* Eight or nine species, tropical Asiatic or African.

Capitules in threes on axillary peduncles; stigma globose... 1. *A. rubescens*.

Capitules in large lax usually terminal panicles; stigma
clavate 2. *A. polycephala*.

1. *ADINA RUBESCENS*, Hemsl. in Journ. Bot. XXV. (1887), 204. A tree 60 to 80 feet high; young branches pale, striate, slender. *Leaves* sub-coriaceous, elliptic, shortly caudate-acuminate, the base cuneate; upper surface glabrous, the lower sometimes puberulous on the nerves, faintly reddish-brown in colour (when dry): main-nerves 8 to 10 pairs, spreading, curving, prominent below; length 2.5 to 4 in.; breadth 1.25 to 1.75 in.; petiole .15 to .25 in., slightly winged for half its length; *stipules* small bifid. *Capitules* about .4 in. in diam. when in flower, in short, pedunculate, trichotomous, pubescent panicles, much shorter than the leaves. *Calyx* pubescent; the lobes very short, oblong. *Corolla-tube* .1 in. long, hairy outside; its lobes 4 or 5, ovate, sub-valvate. *Stamens* inserted in the throat; *anthers* extending to the middle of the lobes, sub-setose at their bases. *Style* exserted; *stigma* globose. *Bracteoles* linear, compressed, pubescent. Havil. in Journ. Linn. Soc. XXXIII. 45.

PERAK: Wray 539; King's Collector 7850. SINGAPORE: Ridley 10458. PENANG: Curtis 369.

2. *ADINA POLYCEPHALA*, Benth. Fl. Hongkong 146. A small tree; the young branches sub-compressed, slender, striate, at first dark but becoming pale. *Leaves* sub-coriaceous, oblong-ob lanceolate, shortly caudate-acuminate, the base alternate; both surfaces glabrous: main-nerves 7 to 10 pairs, curving upwards, slightly prominent beneath;

length 4·5 to 9 in.; breadth 1·5 to 3 in.; petiole ·2 to ·6 in., winged near the apex. *Capitules* about ·35 in. in diam. when in flower, in pedunculate, trichotomously-branched, lax or condensed axillary or terminal pubescent panicles, shorter than the leaves. *Lobes* of the *calyx* oblong, obtuse, persistent. Tube of *corolla* glabrous, narrow; ·1 in. long; lobes 4 or 5, ovate. *Anthers* reaching to the middle of the lobes of the corolla. *Style* exserted, stigma clavate. *Fruit* obovoid, hairy in its upper part: bracteoles filiform. *Seeds* very shortly winged. Miq. Ann. Mus. Lugd. Bat. IV. 183; Koord. & Valet. Bijdr. 8, 17. *Nauclea polycephala*, Wall. Cat. 6100; G. Don Gen. Syst. III. 467; Kurz For. Flora Burma II. 65.

VAR. *macrophylla* Hook. fil. Fl. Br. Ind. II. 25, leaves oblanceolate, with 10 to 12 pairs of main-nerves, 6 to 10 in. long and 2·5 to 4 in. broad. *N. microcephala*, Wall. MSS. in Herb. Hook. *Adina aralioides*, Benth. & Hook. Gen. Plant. II. 30. *Nauclea capitellata*, Voigt Hort. Calc. 375. *N. trichotoma*, Zoll. Verz. Ind. Archipel. 61. *N. aralioides*, Miq. Fl. Ind. Bat. II. 344. *Cephalanthus aralioides*, Zoll. l.c.

PENANG: Curtis 2737, 2751. MALACCA: Ridley 758; Derry 130.—
DISTRIB. Java; Sumatra; Cochin China; Burma; Chittagong.

The variety *macrophylla* is the form most frequent in our region.

6. UNCARIA, Schreb.

Climbing shrubs. *Leaves* shortly petioled; stipules entire or bifid. *Flowers* in peduncled globose heads, solitary and axillary or collected in terminal panicles; peduncles (often without flowers) converted into stout, recurved hooks. *Calyx-tube* cylindric or double fusiform; the limb usually expanded, 5-toothed or 5-lobed. *Corolla* with a long cylindric tube, often expanded towards the apex, the limb with 5 slightly imbricate or valvate lobes, the throat glabrous. *Stamens* 5, inserted by short filaments on the throat of the corolla; *anthers* dorsifixed, with 2 basal bristles. *Ovary* fusiform, 2-celled. *Style* long, slender; *stigma* capitate; ovules many, ascending on the placentas. *Capsule* elongate, usually double fusiform, septicidally 2-valved, many-seeded. *Seeds* minute, numerous, imbricating upwards; the nucleus small, its testa winged at each end; albumen fleshy, embryo clavate, cotyledons short.—DISTRIB.: about 40 species mostly tropical Asiatic.

Lobes of calyx narrow, acute:—

Flowers and capsules subsessile 1. *U. Roxburghiana*.

Flowers and capsules distinctly pedicellate:—

Leaves pubescent beneath:—

Calyx-lobes lanceolate, acute, shorter than the tube:—

Flowers ·75 in. long; leaves ovate-lanceolate, 2·5

to 3·5 in. long 2. *U. lanosa*.

- Flowers 1.5 in. long; leaves broadly oblong or ovate-rotund, 5 to 7 in. long ... 3. *U. sclerophylla*.
- Flowers 1 in. long; leaves 4 or 5 in. long, oblong or ovate, never rotund-ovate ... 4. *U. pedicellata*.
- Calyx-lobes filiform, longer than the tube, spreading; tube of corolla very slender; capsules on long, slender stalks:—
- Young branches, under surfaces of leaves, and capsules rusty-pubescent ... 5. *U. ferrea*.
- Young branches and capsules glabrous; leaves slightly pubescent on the under surface only ... 6. *U. glabrata*.
- Leaves glabrous or nearly so on both surfaces:—
- Lobes of the calyx shorter than the tube ... 7. *U. Kunstleri*.
- Lobes of the calyx as long as the tube ... 8. *U. Wrayi*.
- Lobes of the calyx short, broad, blunt:—
- Leaves quite glabrous, not glaucescent beneath:—
- Leaves 1.75 to 2.5 in. long:—
- Leaves with 3 or 4 pairs of nerves; tube of calyx densely pubescent, the lobes of the limb sub-glabrous ... 9. *U. ovalifolia*.
- Leaves with 5 or 6 pairs of nerves; tube and lobes of calyx pubescent externally ... 10. *U. jasminiflora*.
- Leaves 3.5 in. or more in length:—
- Nerves of leaves 5 or 6 pairs ... 10. *U. jasminiflora* var. *macrophylla*.
- Nerves of leaves 3 pairs ... 11. *U. trinervia*.
- Leaves glabrous, glaucescent beneath; nerves of leaves 7 or 8 pairs, the reticulations transverse and very distinct beneath ... 12. *U. pteropoda*.
- Leaves glabrous, but the 4 or 5 pairs of main-nerves with tufts of hair on the lower surface, at their union with the midrib ... 13. *U. Gambier*.
- Leaves uniformly canescent beneath: nerves 5 or 6 pairs ... 14. *U. canescens*.
- Under surfaces of midrib and the 4 to 6 pairs of main-nerves laxly hirsute, sometimes with tufts of hair in the nerve-axils ... 15. *U. dasyoneura*.
- Calyx-tube long, the teeth very short and blunt:—
- Nerves of leaves 6 to 8 pairs, stout, and bearing like the midrib and transverse veins short pale-brownish hairs ... 16. *U. attenuata*.

1. *UNCARIA ROXBURGHIANA*, Korth. in Ver. Nat. Gesch. Bot. 172. Young branches obtusely 4-angled, densely clothed with minute, partially deciduous, harsh, rusty tomentum. Leaves coriaceous, ovate, acuminate sometimes caudately so; the base rounded, emarginate or minutely cordate; both surfaces reticulate, the upper strigose-scabrid, the lower with longer curved hispid hairs; main-nerves 4 or 5 pairs, curved, spreading, ascending, depressed on the upper and prominent on the lower surface like the midrib; length 2.5 to 3.5 in.; breadth 1.5 to

2 in.; petiole .15 in., tomentose; stipules broad, bifid, glabrous, .2 in. long. *Peduncles* five or six times longer than the petioles, axillary, stout, compressed, tomentose, bracteate near the apex, sometimes one of them barren and forming a much-recurved hook; heads in flower about 1 in. in diam., in fruit rather less. *Calyx* almost sessile, .15 in. long, pilose; the tube oblong-ovoid; lobes of its mouth linear, blunt, twice as long as the tube. *Corolla* about three times as long as the calyx, glabrous: the tube narrowly cylindric, angled, the lobes of the limb broadly oblong, very obtuse. *Capsules* sub-sessile, narrowly double-fusiform, glabrous, .35 in. long, crowned by the short calyx-lobes. Hook. fil. Fl. Br. Ind. III. 32; Havil. in Journ. Linn. Soc. XXXIII. 87.

SINGAPORE: *Anderson* 106; *Ridley* 2844. PERAK: *King's Collector*. 2148. MALACCA: *Maingay* (K.D.) 831.—DISTRIB. Sumatra.

2. UNCARIA LANOSA, Wall. in Roxb. Fl. Ind. ed. Carey & Wall. II. 131: Wall. Cat. 6110. Young branches sparsely hirsute, reddish-brown when dry. *Leaves* membranous, ovate-lanceolate, shortly acuminate, the base rounded or narrowed: upper surface of a warm-brown when dry, glaberrulous or with scattered hairs, the midrib and nerves pubescent: lower surface pale brown, clothed with soft, adpressed long slender tawny hairs especially on the midrib and 6 or 7 pairs of rather bold slightly curved ascending main-nerves; length 2.5 to 3.5 in.; breadth 1 to 1.6 in.; petioles .15 to .2 in. long, pubescent; *stipules* broadly triangular, deeply bifid, reflexed, glabrous inside. *Peduncles* axillary, several times longer than the petioles, tapering upwards, somewhat compressed, pubescent, with 4 linear reflexed glabrous bracts near the apex. *Capitules* .75 in. in diam. when in flower, 2 in. when in fruit. *Calyx* .2 in. long, pedicellate, glabrescent, the tube double-fusiform, not longer than the 5 linear externally hairy lobes of the limb. *Corolla* glabrous, three times as long as the calyx; the tube very narrow, the lobes linear, spreading. *Capsules* clavate-fusiform; .25 to .35 in. long, on long slender pedicels, longer than themselves, glabrous. Hook fil. Fl. Br. Ind. III. 33; Havil. n Linn. Journ. XXXIII. 85. *Nauclea lanosa*, Poir. Encycl. Suppl. IV. 64. *N. setigera*, Blume Bijdr. 1013.

PENANG: *Phillips*; *Curtis* 917. PERAK: *Scortechini*.

3. UNCARIA SCLEROPHYLLA, Hunter in Roxb. Hort. Beng. 86; Fl. Ind. ed. Wall. II. 130; idem ed. Carey I. 520. Very large; young branches as thick as or thinner than a goose-quill, densely rusty-pubescent or villous, 4-angled, sometimes bearing stout recurved hooks. *Leaves* coriaceous, broadly oblong or ovate or rotund-ovate; shortly and bluntly apiculate, the base rounded and sometimes minutely cordate: upper surface dark-coloured, shining, the nerves hairy; the lower densely rusty-pubescent; the midrib, 8 to 10 pairs of main-nerves and

the transverse veins much depressed on the upper, very prominent on the lower surface; length 5 to 6.5 in.; breadth 3 to 5 in.; petiole .4 to .6 in.; stipules large, rounded, bluntly bifid, sparsely hairy, reflexed, .5 in. long. Heads from 4 to 5.5 in. in diam. to the ends of the style, on thick, axillary, rusty-pubescent spreading peduncles shorter than the leaves, bearing a whorl of bracts about the middle. Calyx pedicellate about .5 to .8 in. long, densely adpressed-sericeous, the tube short, ovoid; the limb campanulate, cut into 5 narrowly lanceolate, acute lobes. Corolla villous or sericeous externally; about twice as long as the calyx; its tube narrow, cylindric below; the mouth funnel-shaped and deeply cut into 5 oblong or lanceolate sub-acute, erect lobes. Capsules on slender, rusty stalks; .5 to 1 in. long, oblong, tapering much to each end; densely but shortly rusty-pubescent, ribbed, .6 or .7 in. long, crowned by the large funnel-shaped calyx-limb. *U. sclerophylla*, DC. Prod. IV. 347; Miq. Fl. Ind. Bat. II. 148; Hook. fil. Fl. Brit. Ind. III. 28; Koord. & Valet. Bijdr. 8, 42. *U. speciosa*, Wall. Cat. 6106. *U. insignis*, DC. Prod. IV. 348; Havil. l.c. 78; *U. Ralli*, Korth. Verh. Nat. Gesch. Bot. 165, t. 33. *Nauclea rotundifolia*, DC. Prod. IV. 346. *Nauclea sclerophylla*, Hunter in Trans. Linn. Soc. IX. 223.

In all the provinces except the Andamans, more or less common.—
DISTRIB. Malay Archipelago.

This is closely allied to *U. pedicellata*, Roxb., which see.

4. *UNCARIA PEDICELLATA*, Roxb. Hort. Beng. 86: Fl. Ind. ed. Carey I. 520; idem, ed. Wall. II. 128. Like *U. sclerophylla*, Roxb. in all its parts, but somewhat less robust and much less hairy, the leaves smaller, narrower, never subrotund, paler and much less hairy beneath; sometimes even sub-glabrous; the flowers smaller (only about 1 in. long); the lobes of the calyx only .25 in. long; the tube of the corolla only .4 or .5 in. long, more slender, ferrugineous-silky, rather than pilose or villous; capsule shorter (.5 to .6 in.) but wider in proportion. DC. Prod. IV. 348; Korth. Verh. Nat. Gesch. 166; Miq. Fl. Ind. Bat. II. 142; Hook. fil. Fl. Brit. Ind. II. 28; Havil. in Journ. Linn. Soc. XXXIII. 77 (in part); Koord. & Valet. Bijdr. 8, 43. *U. sclerophylla*, Deless. Ic. Pl., t. 81; Havil. l.c. (in part). *U. ferruginea*, DC. Prod. IV. 348; Korth. Verh. Nat. Gesch. 166; Kurz. Fl. Burn. II. 69. *U. sclerophylla* Havil. (not of Roxb.) in Journ. Linn. Soc. XXXIII. 78. *Uncaria pedicellata*, Bl. Bijdr. 1012. *Nauclea ferruginea*, Bl. Bijdr. 1013.

In all the Provinces, very common.

This closely resembles *U. sclerophylla*, Roxb., and should probably be treated as a variety of that species. In a few specimens of this the under surfaces of the leaves between the reticulations are pale-grey and pitted.

5. *UNCARIA FERREA*, DC. Prod. IV. 348. Young branches much thinner than a goose-quill, minutely but deciduously rusty-pubescent, the bark dark-coloured. *Leaves* membranous, ovate or ovate-lanceolate, shortly and bluntly acuminate, the base rounded or slightly emarginate; upper surface dark-coloured when dry, glabrous or with a few scattered deciduous sub-adpressed pale hairs, the midrib and sometimes the main-nerves pubescent; lower surface pale, minutely reticulate, sub-adpressed rusty-pilose on the midrib and nerves; main-nerves 7 or 8 pairs, curving upwards, depressed on the upper surface like the midrib and prominent on the lower; length 2·5 to 3·25 in.; breadth 1·35 to 2 in.; petioles ·1 to ·2 in., tomentose; stipules broadly semilunar, deeply two-lobed, adpressed rusty-pilose, ·25 in. long. *Peduncles* much longer than the petioles, but shorter than the leaves, lengthening in fruit, compressed, densely ferruginous-tomentose; bracteate above the middle; heads about 1·5 to 2 in. in diam. when in flower, and 2 to 3 in. when in fruit. *Calyx* shortly stalked, ·25 in. long, silky; the tube narrowly oblong-ovoid; the limb deeply divided into filiform lobes longer than the tube. *Corolla* about twice as long as the calyx, glabrous; its tube very narrowly cylindric, angled: the lobes of the mouth broadly oblong or obovoid, very obtuse. *Capsules* double-fusiform, ridged, pubescent, ·5 to ·75 in. long, crowned by the filiform calyx-lobes, tapered into slender pedicels as long as themselves. Hook. fil. Fl. Br. Ind. III. 33; Havil. in Journ. Linn. Soc. XXXIII. 87; Koord. & Valet. 8, 44. *U. Horsfieldiana*, Miq. Fl. Ind. Bat. II. 151. *Nuclea ferrea*, Blume Bijdr. 1014.

PERAK: *Scortechini* 130; *Wray* 2555; *Curtis* 1305; *King's Collector* 2240, 2453, 4899. SELANGOR: *Goodenough*.—DISTRIB. Sumatra; Borneo; Java.

VAR. *tomentosa*; young branches, under-surfaces of leaves and peduncles densely rusty-tomentose, calyx and capsules more silky than in the type.

MALACCA: *Maingay* (K.D.) 830; *Derry* 1070; *Ridley* 10078. PERAK: *King's Collector* 429, 790, 5390. PAHANG: *Ridley* 2192. NEGRI SEMBILAN: *Ridley* 10080. ANDAMANS: *Helper* 2761.—DISTRIB. Java; Sumatra.

6. *UNCARIA GLABRATA*, DC. Prod. IV. 348. As in *U. ferrea* but with young branches glabrous and often bearing shining, much recurved slender hooks about than ·5 in. long; longer peduncles (which are glabrous and bracteate not much below the apex); less filiform, blunt calyx lobes; and glabrous capsules which are thicker but shorter (about ·4 in. long). Havil. in Journ. Linn. Soc. XXXIII. 85; Koord. & Valet. Bijdr. 8, 44. *U. Lobbii*, Hook. fil. in Fl. Br. Ind. III. 33.

SINGAPORE: *Lobb*. 100, 332; *Ridley* 2846, 2853, 8035; *Hullett*; *King's Collector* 277. SELANGOR: *Goodenough*.—DISTRIB. Sumatra; Java; Borneo.

7. *UNCARIA KUNSTLERI*, King n. sp. Young branches thinner than a goose-quill, 4-angled, grooved, deciduously puberulous. *Leaves* coriaceous, elliptic or obovate-elliptic, narrowed to the petiole, the apex with a small blunt-acumen; both surfaces sparsely and minutely puberulous especially on the midrib and 5 or 6 pairs of ascending slightly curved main-nerves; main-nerves depressed on the upper surface, thin but prominent on the lower; length 2.5 to 4 in.; breadth 1.25 to 2.25 in.; petiole .35 to .5 in., puberulous; stipules .3 in. long. *Peduncles* as long as or slightly longer than the petioles, axillary, compressed in the lower half, often hooked, bracteate about the middle; heads nearly 1 in. in diam. when in flower. *Calyx* .1 in. long, its stalk .05 in., densely pubescent, the tube narrowly funnel-shaped, the lobes of the mouth narrowly oblong, acute, shorter than the tube. *Corolla* three times as long as the calyx, adpressed-pilose, very narrowly cylindrical, funnel-shaped in its upper third, the lobes of the limb oblong, blunt.

PERAK: *King's Collector* 5376, 6843.

Very near *U. jasminiflora*, but with more coriaceous leaves, and narrower, more oblong calyx-lobes.

8. *UNCARIA WRAYI*, King n. sp. A bush (P). Young branches half as thick as a goose-quill, dark-coloured, with small pale white lenticels, obtusely 4-angled, glabrous. *Leaves* coriaceous, broadly obovate-elliptic, shortly and bluntly acuminate, narrowed at the base; both surfaces glabrous, the upper shining olivaceous when dry: the lower paler and minutely reticulate (the veinlets very dark); main-nerves 5 pairs, slightly curved, ascending, inconspicuous; length 2.5 to 3 in.; breadth 1.35 to 1.9 in.; petioles .5 in., slender. *Peduncles* axillary, slightly longer than the petioles, compressed; bracteate above the middle; glabrous below the bract and pubescent above it. *Calyx* shortly pedicelled, densely pubescent, .2 in. long; the tube cylindric or somewhat double fusiform, about as long as the narrowly campanulate limb; lobes lanceolate, sub-acute. *Corolla* softly pubescent, known only in bud.

PERAK: *Wray* 2383.

9. *UNCARIA OVALIFOLIA*, Roxb. Hort. Beng. 86; Fl. Ind. I. 519; in Wall. Cat. sub. 6103 B, C, (*U. Gambier*). Young branches thinner than a crow-quill, obtusely 4-angled, glabrous. *Leaves* membranous, elliptic to ovate-elliptic, the apex shortly and obtusely acuminate or sub-acute, the base cuneate; both surfaces glabrous; main-nerves 3 or 4 pairs, ascending, slightly curved, thin; length 1.75 to 2.75 in.; breadth .85 to 1.4 in.; petiole .35 to .45 in., slender, stipules broad, lunate-acute, bifid, .35 in. long. *Peduncles* axillary, about twice as long as the

petioles, slender, rusty-puberulous, or glabrous, occasionally forming compressed tapering much recurved hooks, the bract small and near the base. *Head* about 1 in. in diam. in flower and 1·5 in. in fruit. *Calyx* ·15 in. long, nearly sessile, densely rusty-pubescent except the lobes; the tube narrowly ovoid, contracted into a cylindric deeply lobed limb, the lobes short, broadly oblong, blunt, spreading, sub-glabrous. *Corolla* twice as long as the calyx, very narrowly funnel-shaped, pale pubescent outside, the teeth narrowly oblong, blunt, glabrous inside. *Capsules* narrowly double-fusiform, occasionally somewhat curved, about ·4 or ·5 in. long, crowned by the thick, erect calyx-tube, narrowed into the short rusty pilose pedicel, adpressed-pubescent. Hook. fil. Fl. Br. Ind. III. 30. *N. ovalifolia*, Spreng. Syst. IV. Curae Post. 80.

MALACCA: *Griffith* (K.D.) 2758, 2759; *Cunning* 2292. SELANGOR: *Curtis* 2342. PERAK: *Scortechini*; *King's Collector* 5262.—DISTRIB. Burma; Borneo.

10. UNCARIA JASMINIFLORA, Hook. fil. Fl. Br. Ind. III. 32. Young branches thinner than a goose-quill, somewhat compressed, 4-angled, puberulous. *Leaves* thinly coriaceous, broadly elliptic, rarely elliptic-lanceolate, with an abrupt, short, blunt acumen, the base rather abruptly narrowed to the slender petiole; both surfaces glabrous; when adult the nerves and midrib on the lower surfaces puberulous; when young the upper pale brown and shining when dry; the lower paler and minutely reticulate; main-nerves 5 or 6 pairs, spreading, curving upwards, thin; length 2 to 2·5 in.; breadth 1 to 1·5 in.; petiole ·5 in., puberulous; stipules entire, ·2 in. long. *Peduncles* axillary, longer and thicker than the petioles; compressed, puberulous; heads rather more than 1 inch in diam. when in flower, about 1·75 when in fruit, bracteate near the apex. *Calyx* shortly pedicellate, ·15 in. long, adpressed pilose; the tube shortly double-fusiform, about as long as the campanulate limb, lobes short, broad, obtuse, glabrous inside. *Capsules* about ·5 in. long, double-fusiform, crowned by the calyx-limb, ridged, puberulous, their pedicels slender, ·15 to ·2 in. long. Wall. Cat. 6103 C.F.; Havil. in Journ. Linn. Soc. XXXIII. 80.

MALACCA: *Griffith* (K.D.) 2766; *Maingay* (K.D.) 832, 833. SINGAPORE: *Ridley* 10415, 6467; *King* 382. PERAK: *King's Collector* 4619, 7860; *Wray* 3124. SELANGOR: *Ridley* 8579.—DISTRIB. Borneo.

VAR. *macrophylla*, King. Stem-hooks stout, compressed, much curved. *Leaves* 3·5 to 5 in. long, dark brown and very shining in the upper surface, 3·5 to 5 in. long and 2 to 2·5 in. broad; capsules nearly glabrous.

SINGAPORE: *Schomburgk* 65; *Anderson* 87; *Hullett* 41, 75.

11. UNCARIA TRINERVIS, Haviland in Journ. Linn. Soc. XXXIII.

80. Young branches thinner than a goose-quill, obtusely 4-angled, compressed and broad at the nodes, pale brown, glabrous; the hooks much curved and compressed. *Leaves* coriaceous, pale brown when dry, ovate or elliptic, slightly and abruptly narrowed at the base, the apex shortly, abruptly and broadly acuminate; both surfaces quite glabrous, with fine transverse veins and minute reticulations; main-nerves 3 pairs, ascending, depressed on the upper, but prominent on the lower surface; length 3.5 to 4.5 in.; breadth 1.75 to 2.5 in.; petiole .7 to .9 in.; stipules small, broad, entire. *Inflorescence* racemose; peduncles .75 in. long, compressed, minutely pubescent; their bases broad and glabrous; bracts (*vide* Haviland) entire, .15 in. long. *Heads* (including the styles) about 1 in. in diam., the flowers sub-sessile, pale tomentose externally. *Calyx* .1 in. long, its lobes broad, blunt. *Corolla* .25 in. long, the tube cylindrical; the lobes broad, blunt. *Capsules* double-fusiform, crowned by the conspicuous calyx, minutely pilose, .5 in. long; *receptacles* without bracteoles, hirsute.

PENANG: *Curtis* 1247. PERAK: *Curtis* 2981.

Allied to *U. pteropoda*, Miq., but with smaller quite glabrous leaves which have only 3 pairs of nerves and with smaller flowers. Allied also to *U. canescens*, Korth., from which it is distinguished by its smaller, fewer-nerved, glabrous leaves.

12. UNCARIA PTEROPODA, Miq. Fl. Ind. Bat. II. 343. Young branches 4-angled, somewhat compressed, broadly grooved, as thick as a goose-quill, glabrous. *Leaves* coriaceous, elliptic-rotund, the apex with a short, broad, blunt point, the base broad and rounded; both surfaces glabrous, the upper shining, minutely reticulate (when dry): the lower pale-glaucescent; main-nerves about 8 pairs, deeply depressed like the midrib on the upper surface, prominent on the lower, spreading, curving slightly upwards; length 5 to 6.5 in.; breadth 3.5 to 5 in.; petiole .35 to .85 in. long, with a broad undulate wing. *Peduncles* axillary, strong, much compressed, grooved, somewhat longer than the petioles, often much recurved, bracteate near the apex; sometimes collected into a terminal panicle longer than the leaves; *heads* about 1 inch across when in flower, two or three times as much when in fruit. *Calyx* shortly stalked, .25 to .3 in. long in flower, rusty-pubescent; its tube narrow, double-fusiform, about .25 in. long, crowned by the short narrowly campanulate limb, its lobes narrowly oblong, blunt or sub-acute. *Corolla* nearly three times as long as the calyx, silky, the tube narrowly cylindrical; the lobes of the limb broad, obovate, blunt. *Capsules* narrowly double-fusiform, .6 to .75 in. long, up to 1 in. when quite ripe; on stalks nearly as long, minutely rusty-pubescent, crowned by the short calyx-tube. Hook. fil. Fl. Br. Ind. III. 29; Havil. in Journ. Linn. Soc. XXXIII. 82.

SINGAPORE: *Ridley* 2854; *Anderson* 105. PERAK: *Wray* 2738, 3115 *Scortechini* 256; *King's Collector* 2528, 4587, 6576, 7831, 7882, 10189, 10593. PENANG: *Phillips*; *Curtis* 332. MALACCA: *Maingay* (K.D.) 829. —DISTRIB. Sumatra; Borneo.

A very distinct species, the leaves drying of a pale colour.

13. *UNCARIA GAMBIEI*, Hort. Beng. 86; Fl. Ind. I. 517. Young branches thinner than a goose-quill, obtusely 4-angled, glabrous. Leaves thinly coriaceous, olivaceous; brown when dry, the lower surface paler; ovate or oblong-ovate, shortly acuminate, the base usually rounded, occasionally a little narrowed and oblique; both surfaces glabrous except for the tufts of hair at the origin of the main-nerves from the midrib on the lower: main-nerves 4-5 pairs, curved, spreading, obscure on the upper, bold on the lower surface (when dry); length 3 to 4.5 in.; breadth 1.85 to 2.25 in.; petioles .2 to .25 in.; stipules ovate, bluntly acuminate, .3 in. long. Peduncles axillary, usually shorter than the leaves, slightly compressed, bracteate above the middle, glabrous below and pubescent above the bract; heads 1.75 in. in diam. when in flower, 2.75 in. in fruit. Calyx shortly stalked, .35 in. long, densely adpressed-silky; the tube cylindric, ridged; the mouth campanulate, somewhat shorter than the tube; its lobes spreading, ovate, blunt, glabrous inside. Corolla .5 in. long, narrowly funnel-shaped, with sparse (rarely dense) white hairs outside, the lobes broadly oblong, blunt, densely silky outside, glabrous inside. Capsules narrowly double-fusiform, sometimes curved, .75 to 1 in. long, crowned by the large calyx-tube, ridged, sparsely pubescent; the pedicels unequal, .2 to .4 in. long. Korth. Verh. Nat. Gesch. Bot. t. 34: Hook. fil. Fl. Br. Ind. III. 31: Havil. in Journ. Linn. Soc. XXXIII. 81; Wall. Cat. 6103 A.E.C. (in part) and 6107 in part. *Nauclea Gambier*, Hunter in Linn. Trans. IX. 218 t. 22; Flem. in As. Res. XI. 187. *U. acida*, Roxb. Fl. Ind. I. 520. *Nauclea acida*, Hunter in Linn. Trans. IX. 223.

SINGAPORE: *Cunning* 2403; *Anderson* 95; *Ridley* 2843; *Walker* 90; *King's Collector* 1158; *Hullett* 361. PERAK: *King's Collector* 2262. JOHOR: *King* 671. MALACCA: *Derry* 59; *Griff.* 2757.—DISTRIB. Over the whole Malayan Archipelago either cultivated or wild.

Maingay No. 827 differs from the sheets above noted in having brown leaves and rusty-pubescent. This may be the species named *U. acida* by Roxburgh whose description makes it impossible now to distinguish it from *U. Gambier*.

14. *UNCARIA CANESCENS*, Korth. Verh. Nat. Gesch. 172. A slender creeper; young branches thicker than a crow-quill; grooved, compressed and obtusely 4-angled, minutely pubescent. Leaves coriaceous,

olivaceous and shining on the upper surface, pale and dull on the lower (when dry), elliptic or ovate-elliptic, abruptly, bluntly and shortly acuminate, rounded or slightly narrowed at the base; upper surface glabrous except the puberulous midrib and nerves, the lower minutely pale-puberulous; main-nerves 5 or 6 pairs, depressed on the upper and prominent on the lower surface, slightly curved, ascending; length 3.5 to 5 in.; breadth 1.85 to 3 in.; petioles .5 to .7 in., pubescent. *Peduncles* slender, slightly longer than the petioles, densely rusty-pubescent in the upper parts bracteate about or below the middle; heads .5 or .6 in. in diam. *Calyx* .15 in. long, shortly stalked, adpressed rusty-pilose, the tube double-fusiform, the mouth expanded, its lobes broad, blunt, glabrous within. *Corolla* rather more than twice as long as the calyx, pilose, the tube very narrowly cylindrical; the lobes of the mouth short, lanceolate-ovate, sub-acute, glabrous inside. *Capsules* unknown. Hook. fil. Fl. Br. Ind. III. 29: Havil. in Journ. Linn. Soc. XXXIII. 80.

PERAK: *King's Collector* 3871, 4584. PENANG: *Griffith, Curtis* 331.

15. *UNCARIA DASYONEURA*, Korth. Ver. Nat. Gesch. 169. Young branches obtusely 4-angled, glabrous. *Leaves* elliptic or elliptic-rotund, shortly, abruptly and bluntly acuminate, the base rounded or narrowed, upper surface dark-brown when dry, glabrous, shining; the lower paler brown; laxly hirsute on the midrib and nerves, otherwise glabrous, rarely with tufts of hair in the nerve axils; main-nerves 4-6 pairs, very slightly curved, ascending, distinct below; the intermediate veins horizontal: length 3 to 4 in.; breadth 1.75 to 2.25 in.; petioles about .5 in. long, narrowly winged above, glabrous; *stipules* minute; entire. *Peduncles* shorter than the petioles, broad, glabrous and compressed at the base, thin and pubescent in the upper two-thirds, with deciduous, linear-oblong bracts at the point of constriction. *Flowers* sub-sessile. *Calyx* narrowly urceolate, minutely ferruginous-tomentose, about .15 in. long; its limb with broad, blunt lobes. *Corolla* three times as long as the calyx: the tube narrowly cylindric, adpressed hairy, the limb shortly campanulate, with 5 blunt lobes, glabrous inside. *Capsules* narrowly double-fusiform, glabrous, .8 in. long, their pedicels shorter. Miq. Fl. Ind. Bat. II. 143; Hook. fil. Fl. Br. Ind. III. 31; Havil. in Linn. Journ. XXXII. 82. *U. Gambier*, Thw. Enum. Pl. Zeyl. 138. *U. elliptica*, R. Br. in Wall. Cat. 6104 A. (in part), B.

MALACCA: *Griffith* 2756; *Maingay* (K.D.) 827/2. SINGAPORE: *Lobb*. PENANG: *Phillips*; *Curtis* 1070. PERAK: *King's Collector* 2501.—DISTRIB. Java, Ceylon.

16. *UNCARIA ATTENUATA*, Korth. in Verh. Nat. Gesch. Bot. 170; t. 34. Young branches thinner than a goose-quill, obtusely 4-angled, minutely rusty-pubescent. *Leaves* coriaceous, broadly elliptic or ovate-

elliptic, slightly narrowed at base, the apex with a very short, blunt acumen; upper surface dark olivaceous-brown, shining; lower warm brown, with short pale brownish hairs on the midrib, nerves, and their axils, and on the distant transverse veins: main-nerves 6 to 8 pairs, boldly prominent on the lower, depressed on the upper surface; rather straight, ascending; length 3 to 5 in.; breadth 1.75 to 3 in.; petiole .4 to .5 in. *Peduncles* solitary, axillary, about twice as long as the petioles, much compressed in the lower half, rusty-pubescent. *Heads* (to the ends of the styles) nearly 1.5 in. in diam. *Flowers* shortly pedicellate. *Calyx* .15 in. long, funnel-shaped, rusty-tomentose; the tube slightly inflated, the limb as long as the tube with short blunt teeth. *Corolla* twice as long as the calyx, narrowly cylindric, the mouth abruptly expanded and cut into 5 deep, broad, blunt, oblong lobes. *Capsules* narrowly double-fusiform, crowned by the wide calyx-limb, .7 to .9 in. long, rusty-tomentose. *U. Gambier*, Wall. Cat. 6105 C. *in part.* Hook. fil. Fl. Br. Ind. I. 29; Havil. in Journ. Linn. Soc. XXXIII. 83. ? *U. sclerophylla*, Deless. Ic. Select. III. t. 81.

MALACCA: *Holmberg* 889. PENANG: *Hunter, Phillips, Curtis* 135. PERAK: *King's Collector* 4880; *Wray* 3150. TENASSERIM and ANDAMANS: *Helper* (K.D.) 2767.—DISTRIB. Borneo; ? Java.

DOUBTFUL SPECIES.

UNCARIA OVATA, R. Br. in Wall. Cat. 6112: Hook. fil. Fl. Br. Ind. III. 29. The single sheet bearing the No. 6112 in the Wallichian Herbarium at Burlington House has two things glued down on it, viz., two twigs of *U. Gambier*, Roxb., and a third twig which must, by exclusion, be this. Unfortunately a specimen exactly resembling this third twig, collected by Finlayson and probably, like so many of his plants, in Siam, was issued by Wallich under the number 6103 D. and the name *U. Gambier*, while another also exactly like it, but collected in Sylhet, was issued by him under the number 6107 and the name *U. sessilifolia*. I have seen no Malayan specimens which resemble these two except the one attributed by Wallich to Singapur, which I, therefore, believe must have been so attributed as the result of some confusion of specimens at the time of issue.

7. COPTOSAPELTA, Korth.

Scandent shrubs with terete branches. *Leaves* coriaceous, softly hairy beneath; stipules small, triangular, deciduous. *Flowers* in terminal many-flowered often thyrsoid panicles; the buds 5-angled; the pedicels short, bi-bracteolate. *Calyx-tube* ovoid, 5-ridged, the limbs shortly 5-toothed, persistent. *Corolla* coriaceous, salver-shaped; the tube narrow, its throat naked or hairy; the limb deeply divided into 5 linear-oblong, blunt, valvate lobes, longer than or as long as the tube. *Stamens* 5, inserted on the throat; anthers long, linear, flexuose, bifid at

the base, hairy on the back; filaments short, subulate. Ovary 2- to 3-celled, with many ascending ovules, the placentas on the septum. Style short; stigma exserted, long-fusiform, or quadrangular. Capsule 2-3-celled, sub-globose, loculicidally dehiscent by 2 or 3 valves. Seeds small, numerous, peltate, imbricate, winged; embryo straight, in fleshy albumen.—DISTRIB. Species all Malayan.

Corolla-tube nearly as long as the lobes, its throat glabrous;

calyx-tube under .05 in. in diam. ... 1. *C. flavescens*.

Corolla-tube much shorter than the lobes, its throat densely

woolly; calyx-tube more than .15 in. diam. ... 2. *C. Griffithii*.

1. *COPTOSAPELTA FLAVESCENS*, Korth. in Ned. Kruidk. Arch. II. 113.

Young branches, panicles and under surfaces of the leaves covered with soft, minute, partly deciduous hair. Leaves elliptic or ovate, minutely apiculate, the base rounded, somewhat narrowed; upper surface glabrous and shining; main-nerves 4 or 5 pairs, curving upwards, slightly prominent on the lower surface; length 2.5 to 4 in.; breadth 1.5 to 2.5 in.; petiole .2 to .3 in., pubescent. Stipules very acuminate, .15 in. long. Flowers about 1 in. long (of which the calyx forms only .15 in.) Calyx under .05 in. in diam., tubular, 5-ridged, pilose; the 5 teeth small, erect, sub-glabrous. Corolla-tube .3 in. long, narrow; the lobes of the limb oblong, blunt, .4 in. long, reflexed, glabrous or sub-glabrous. Anthers and stigma nearly as long as the corolla-lobes. Stigma cylindric-fusiform, puberulous. Capsule broadly obovoid, glabrous, .3 or .4 in. in diam. Hook. fil. Fl. Br. Ind. III. 35. *Stylacoryne macrophylla*, Wall. Cat. 8405 (excl. syn.) *Webera macrophylla*, Roxb.

PENANG: Porter, Griffith (K.D.) 2788. MALACCA: Maingay (K.D.) 908. PERAK: Wray 1801, 2521, 4276; King's Collector 4651, 7938, 10384, 10393, 10353. PAHANG: Ridley 2192.—DISTRIB. Burma; Malay Archipelago.

2. *COPTOSAPELTA GRIFFITHII*, Hook. fil. Hook. Ic. Plant. t. 1089: Fl. Br. Ind. III. 35. Leaves as in *C. flavescens*; but with only 3 pairs of nerves and the under surface paler and rather more hairy; also the panicles with fewer flowers. Flowers only .85 in. long, their buds nearly .15 in. in diam. Calyx rather more than .2 in. long and .15 in. in diam., the tube densely tomentose: the limb scantily hairy, cylindric, nearly as long as the tube; its 5 or 6 teeth short, broad, erect. Corolla-tube .25 in. long and half as much wide, the throat densely woolly, the lobes of the limb linear-oblong, obtuse, reflexed, twice as long as the tube, rusty adpressed-pubescent on the lower, glabrous or sub-glabrous on the upper surface.

MALACCA and SINGAPORE: Griffith (K.D.) 2789; Maingay (K.D.) 907. PERAK: Scortechini 1983; Wray 1827; King's Collector 4366, 7938.

SINGAPORE: *King's Collector* 75. *Anderson* 101; *Ridley* 6824, 6891.
PAHANG: *Ridley* 2229.

8. MUSSAENDOPSIS, Baillon.

A tall tree, all parts glabrous except the inflorescence. *Leaves* very coriaceous, broad, entire, petiolate, main-nerves few, stout, veins indistinct; stipules coriaceous, oblong, blunt. *Flowers* shortly pedicellate in lax, axillary, cymose panicles, with opposite spreading branches. *Calyx* puberulous, campanulate; the limb truncate, with 5 minute, broad lobes, one of them occasionally developed into a large coloured obovate 5-nerved lobe attenuate at base, 1 in. long. *Corolla* short, puberulous outside, ovoid in bud: the tube very short or none, the lobes 5, thick, oblong, slightly twisted in bud, slightly papillose near the margin. *Disc* fleshy. *Stamens* 5; anthers linear-oblong, curved. *Style* fleshy, short, lobes of the stigma short, thick, rounded. *Ovary* 2-celled, the placentas attached to the septum. *Ovules* numerous. *Fruit* capsular, many-seeded, septicidal. *Seeds* small, winged at the margin; embryo fleshy with scanty albumen. A single species, Malayan.

MUSSAENDOPSIS BECCARIANA, Baillon in *Adansonia*, XII. 282. A tree 100 feet high. *Leaves* sub-orbicular to elliptic, shortly apiculate, 4 to 6 in. long and 2.75 to 4.5 in. broad: main-nerves about 6 pairs, rather straight, depressed on the upper and prominent on the lower surface: petiole .75 to 1 in. long: stipules oblong, blunt, almost as long as the petiole. *Panicles* about 8 in. in diam., and half as much long; their peduncles 3 to 4 in. long. *Calyx* 1.5 in. long: the foliaceous lobe obovate, tapering to the base, 1 to 1.25 in. long and .6 to .8 in. broad, white. *Corolla* lobes about .15 in. long and .1 in. broad, spreading or reflexed. *Capsule* oblong-subclavate, slightly compressed, .6 in. long; puberulous, very coriaceous, splitting from above downwards, the septum also coriaceous. *Stapf* in *Hook. Ic. Pl.* 2388. *Creaghia fagraeopsis*, *Scortechini* in *Journ. Bot.* 1884, 370.

MALACCA: *Maingay* (K.D.) 835, 1692; *Derry* 1044. PERAK: *Scortechini*, *King's Collector* 6195.—DISTRIB. Borneo, *Beccari*, *Haviland*; Sumatra, *Ridley* 9016.

9. GREENIA, W. & A.

Shrubs with terete branches. *Leaves* sometimes in whorls of three, membranous; stipules various. *Flowers* small, sessile, in terminal, panicled, scorpioid cymes, with or without bracteoles. *Calyx-tube* turbinate with 4 or 5 short, erect, persistent, subulate or ovate lobes, one longer than the others. *Corolla* funnel-shaped, pointed in bud, pubescent outside: the tube long almost glabrous inside; the limb with 4 or 5 erect ovate lobes, valvate in bud, but twisted. *Stamens* 4 or 5, inserted

by short filaments on the mouth of the corolla; anthers bifid at base and apex, slightly exserted. *Ovary* 2- (rarely 3-) celled; ovules numerous on peltate placentas attached to the septum: *style* filiform; *stigmas* 2, exserted, linear, revolute. *Capsule* small, globose, crustaceous, 2-celled, dehiscing septicidally by 2 valves. *Seeds* falcate or rather square, somewhat compressed; the testa reticulate and sub-acute; embryo small, clavate, in fleshy albumen.—*DISTRIB.* Species 5 or 6, Malayan and Burmese.

GREENIA JACKII, W. & A. Prod. 404. An evergreen shrub. *Leaves* oblanceolate, minutely acuminate, gradually narrowed from above the middle to the short petiole, drying brown: upper surface with the midrib minutely pubescent; otherwise sparsely adpressed-puberulous, or quite glabrous; lower surface softly tawny-pubescent, especially on the midrib and 20 to 30 pairs of slightly curved, spreading main-nerves, or subglabrous; length 6 to 12 in.; breadth 2 to 3.5 in.; petioles .4 to 1 in., pubescent. *Stipules* broad, abruptly acuminate, .4 in. long, or broadly lanceolate and about .6 in. long. *Panicles* terminal, branched, shorter than the leaves, on long, compressed, pubescent peduncles, the lower branches nearly as long. *Flowers* numerous, secund, sessile, .3 to .35 in. long; the corolla several times longer than the calyx. *Capsule* globose, less than .1 in. in diam. crowned by the spreading calyx-lobes; the epicarp adpressed, pubescent, peeling off and showing the glabrous endocarp. Hook. fil. Fl. Br. Ind. III. 41. *Rondeletia corymbosa*, Jack in Mal. Misc. I. 4; *R. spicata*, Wall. in Roxb. Fl. Ind., ed. Carey & Wall. II. 139. *Wendlandia? corymbosa*, Wall. Cat. 6276; DC. Prod. IV. 413; Kurz For. Fl. Burma. II, 75; *W.? spicata*, DC. l.c. 412.

In all the Provinces.

Rather variable as regards pubescence and the shape of the stipules: differs from the closely allied *G. Wightiana*, W. & A., chiefly in its leaves, having twice as many nerves as that species.

10. DENTELLA, Forst.

A small prostrate much-branched herb with 4-angled stems thinner than a crow-quill, rooting at the nodes, 4 to 12 inches long. *Leaves* small, shortly petioled; the stipules short, scarious. *Flowers* small, solitary in the axils of the leaves and forks of the branches, sessile or shortly pedicelled. *Calyx-tube* sub-globose; the limb membranaceous, tubular, toothed, persistent. *Corolla* white, funnel-shaped; the tube hairy inside: the limb with five 2- or 3-toothed lobes, valvate in the bud, but with the edges induplicate. *Stamens* 5, attached in the middle of the corolla-tube; *anthers* included, dorsifixed, linear, entire at base and apex; filaments short. *Ovary* 2-celled, with numerous ovules or hemispheric

placentas. *Style* short; stigmas 2, filiform, papillose. *Fruit* rather large for the size of the plant, dry, globose, 2-celled, indehiscent, with many minute, angled, dotted seeds.—*DISTRIB.* A single species inhabiting Asia, tropical Australia, and the islands of the Pacific.

DENTELLA REPENS, Forst. Char. Gen. 26; t. 13. *Leaves* obovate-spathulate or oblanceolate, one-nerved, puberulous, .2 to .3 in. long, and less than .1 in. broad. *Flowers* .25 to .3 in. long. *Calyx*-tube somewhat compressed, shorter than the 5-toothed erect limb. *Corolla* longer than the calyx. *Style* bifid nearly to the base. *Capsule* pellucid-hispid or glabrous, somewhat compressed, broadly ovoid, with 2 vertical grooves, about .1 in. long, crowned by the membranous calyx-tube. Roxb. Fl. Ind. I. 532; Wall. Cat. 6206; W. & A. Prod. Fl. Penins. Ind. 405; Dalz. & Gibs. Fl. Bomb. 115; Hook. fil. Fl. Br. Ind. III. 42. *Oldenlandia repens*, Linn. Mant. 40. *Hedyotis repens*, Lam. Ill. 1424 (not of Don). *Lipaya telephioides*, Endl. Atakt. t. 13.

In moist spots near cultivation: in all the provinces.

11. ARGOSTEMMA, Wall.

Small, delicate, flaccid or somewhat fleshy herbs, glabrous or pilose, the hairs sometimes jointed. *Leaves* usually membranous, the leaves in pairs, equal or very unequal, opposite or sub-verticillate. *Stipules* entire, persistent, or obsolete. *Flowers* in pedunculate cymes or umbels. *Calyx*-tube short, campanulate, turbinate or obconic: its lobes usually 4 or 5 (sometimes 3-7). *Corolla* white, rotate, with 4 or 5 valvate lobes. *Stamens* 4 or 5; anthers large, elongate, free, connivent or coherent, erect or declinate, dehiscing by 1 or 2 terminal pores or by longitudinal slits; filaments short. *Ovary* 2-celled; ovules numerous on placentas projecting from the septum. *Style* filiform, stigma capitellate. *Capsule* membranous or coriaceous, 2-celled, many-seeded, dehiscence valvular or opercular. *Seeds* minute, angled or compressed; testa reticulate or muriculate, punctate; embryo very small, in dense fleshy albumen.—*DISTRIB.* Species about 40 or 50, mostly from mountains, in sub-tropical Asia and in Malaysia.

Leaves of the pairs equal in size, or one smaller but not minute:—

Leaves numerous, in a pseudo-whorl near the apex of the stem ... 1. *A. acuminatum*.

Leaves a single pair at the apex of the stem:—

Flowers .15 in. long ... 2. *A. pictum*.

Flowers .3 in. long ... 3. *A. subinequale*.

Leaves two pairs at the apex of the stem ... 2. *A. pictum* var.

tetraphylla.

Leaves in a pseudo-whorl at the base of the stem ... 6. *A. nutans* var.
verticillata.

Leaves numerous scattered along the whole length
of the stem :—

Leaves glabrous :—

Leaves thickly membranous, narrowly elliptic,
acute at the base ... 4. *A. Fappii*.

Leaves thinly membranous, broadly ovate, the
base widely cordate ... 5. *A. membranaceum*.

Leaves more or less pubescent :—

Cymes dense, many-flowered :—

Leaves oblong-elliptic, oblong, or elliptic, sub-
acute, flowers drooping in bud ... 6. *A. nutans*.

Leaves broadly oblanceolate, shortly acuminate;
flowers erect in bud ... 7. *A. urticifolium*.

Cymes lax, few-flowered ... 8. *A. Ridleyi*.

Leaves of the pairs very unequal, the smaller one minute
and about equal to the stipules :—

Leaves a single pair at the apex of the stem :—

Corolla with narrow buds, its lobes lanceolate;
anthers with apical appendages longer than themselves,
the filaments thick; leaves with 5 or 6 pairs
of main-nerves ... 9. *A. unifolium*.

Corolla ovate in bud; its lobes boldly nerved,
ovate; anthers sessile, their apical appendages
short: leaves with 9 to 14 pairs of main-nerves ... 10. *A. unifolioloides*.

Leaves several pairs crowded near the apex of the
(often short) stem, pubescent; flowers .35 to .4 in.
long, glabrous: calyx-lobes short, acute; calyx and
corolla glabrous ... 11. *A. spinulosum*.

Leaves scattered along the whole length of the stem :—

Leaves more or less pubescent on both surfaces,
the lower not glaucous: calyx hairy and corolla
glabrous externally ... 12. *A. Elatostemma*.

Leaves pubescent on both surfaces; or if glabrescent
(var.) the midrib, nerves and edges with a
few short, thick hairs; calyx and corolla pubescent
externally ... 13. *A. involucreatum*.

Leaves quite glabrous, succulent :—

Leaves linear-oblong; main-nerves obscure ... 14. *A. Curtisii*.

Leaves elliptic- or oblanceolate-oblong; with 7 to
12 pairs of main-nerves ... 15. *A. subcrassum*.

Leaves glabrous on both surfaces, occasionally with
a few adpressed hairs, not glaucous beneath :—

Leaves thinly membranous, broadly oblanceolate,
flowers in terminal umbels ... 16. *A. perakense*.

Leaves thickly membranous :—

Leaves with broad, obliquely pseudo-cordate
bases ... 17. *A. oblongum*.

Leaves with narrow bases never pseudo-cordate:—

Stem terete, scurfy; leaves more or less oblanceolate, 1·35 to 4·5 in. long: flowers 4 in. long: calyx-lobes broad, ovate ... 18. *A. ophirensse*.

Stem angled, not scurfy: leaves lanceolate, 2 to 3 in. long: calyx-lobes lanceolate, acuminate ... 19. *A. Wrayi*.

Leaves glabrous except the midrib and nerves, under surfaces glaucous:—

Leaves distinctly petiolate, ovate, or oblong-lanceolate, unequal but not cordate at the base, 75 to 1·35 in. long: calyx campanulate ... 20. *A. Hookeri*.

Leaves sessile or very nearly so, elliptic-oblong, unequal and cordate at the base, 1·5 to 2·15 in. long: calyx rotate ... 21. *A. bicolor*.

1. ARGOSTEMMA ACUMINATUM, King n. sp. Glabrous except occasionally for a few scattered minute pale hairs on both surfaces of the leaves; about 12 in. high. Stem erect, unbranched, twice as thick as a crow-quill when dry, obscurely 4-angled or minutely winged, naked. Leaves crowded near the apex of the stem, thinly membranous when dry, very unequal; the larger of each pair oblong-lanceolate, sometimes sub-oblique or sub-falcate, the apex acuminate, gradually narrowed from above the middle into a petiole of varying length; both surface glabrous; drying of a deep olivaceous colour, the midrib broad and rather distinct and the 10 to 15 pairs of curved spreading nerves indistinct; length 3·5 to 6·5 in.; breadth 1 to 1·5 in.; petioles 1 to 4 in.; the smaller leaf of the pair sessile, sub-rotund, under 1 in. long. Stipules usually with broad bases and acuminate apices about the same length as the smaller leaf. Oymes terminal, about half as long as the leaves, pedunculate, di- or tri-chotomous; the peduncle and branches slender, slightly swollen and bracteolate near the divisions. Flowers few, 3 in. long on capillary pedicels longer than themselves and bracteolate at the base. Calyx campanulate with 5 broad, blunt, spreading lobes. Corolla nearly three times as long as the calyx, its lobes slightly shorter than the staminal cone: anthers linear-lanceolate, acuminate, dehiscing longitudinally, the connective forming narrow marginal wings and long flattened, apical appendages. Style somewhat longer than the anthers: stigma clavate. Capsules almost hemispheric, crowned by the obscurely toothed cupular remains of the calyx, smooth, 15 in. in diam. Seeds rather large for the genus, angled, pitted, black.

PENANG: Wallich. SELANGOR: Ridley 8233.

This plant was collected 65 years ago in Penang by Wallich, and until Mr. Ridley obtained it in Selangor it does not appear to have been found since. In the

Flora of British India it has been put under *A. verticillatum*, Wall.—a species originally described by Wallich from the Nepal Himalaya, from which species this differs amongst other things in its larger size and more numerous leaves.

2. *ARGOSTEMMA PICTUM*, Wall. in Roxb. Fl. Ind. ed. Carey and Wall. II. 327. A succulent herb 3 to 5 in. high. Stem 1 to 2 in. long, twice as thick as a crow-quill, ebracteate, glabrous. Leaves a single pair at the apex of the stem, membranous, sub-equal, broadly or rotund-ovate, sub-acute or obtuse; the base broad, sub-truncate or slightly cordate, upper surface blackish-brown when dry, glabrous or with sparse, short, thick hairs, the midrib and nerves faint (when dry); lower surface paler, glabrous or with a few coarse hairs on the 4 or 5 pairs of rather straight, ascending, broad, flat main-nerves; midrib broad, flat; length 1.5 to 3.5 in.; breadth 1.25 to 2.5 in.; petiole under .1 in. or none. Stipules lanceolate or ovate, acute, .2 to .3 in. long. Umbel solitary, terminal, on a slender, ebracteolate peduncle, more slender than the stem and from .75 to 2 in. long. Flowers from 8 to 12, drooping in bud, .15 in. long (to the end of the exerted style), on pedicels more than twice as long, with a whorl of small bracteoles at their bases. Calyx narrowly campanulate, coarsely puberulous, with 5 acute, triangular, erect lobes. Corolla nearly twice as long as the calyx, its 5 lobes oblong, obtuse, reflexed, rather longer than the stamens. Anthers free, oblong, blunt, dehiscing longitudinally, not apiculate, the base bifid, the connective behind the cells thickened; filament short, broad, thick. Style filiform, longer than the anthers; stigma small, capitate. Wall. Cat. 8392: Benn. Pl. Jav. Rar. 94: Hook. fl. Fl. Br. Ind. II. 43.

PERAK: King's Collector 3105, 3110, 10585, 10586; Scortechini 310; Wray 1202. PENANG: Curtis 480. MALACCA: Maingay (K.D.) 896.

VAR. *tetraphylla*. Leaves in two unequal pairs, or three in a whorl.

PERAK: Wray 1202.

3. *ARGOSTEMMA SUBINEQUALE*, Benn. Pl. Jav. Rar. 95. Glabrous; succulent when fresh, 4 to 8 in. high: stem fleshy when fresh, thinner than a goose-quill, 1.5 to 4.5 in. long, ebracteolate. Leaves membranous, only a single pair, somewhat unequal (rarely a whorl of three) broadly ovate-oblong to ovate-elliptic, acute or bluntly acuminate, the base truncate and broad or slightly cuneate; upper surface brown when dry, glabrous, the nerves and midrib indistinct; lower surface paler, glabrous except for a few hairs on the broad flattened midrib and 5 or 6 pairs of broad, flat, obliquely ascending main-nerves; length of the longer leaf 4 to 6 in.; breadth 2.5 to 3.5 in.; of the smaller leaf 2 to 3 in.; breadth 1.75 to 2 in.; petioles .1 to .2 in. Stipules lanceolate, .3 to .75 in. long. Oymes umbellate, terminal, solitary or in pairs, pedunculate; peduncles slender, bearing a pair or whorl of lanceolate bracteoles near the middle.

Flowers 3 in. long, numerous, on pedicels shorter or longer than themselves, pubescent, bracteolate at the base. *Calyx* campanulate; the tube small, narrow; the 4 lobes thin, lanceolate, much longer than the tube. *Corolla* longer than the calyx; its lobes 5, imbricate, ovate-lanceolate, acute, spreading slightly, imbricate. *Anthers* alternately quite free, at first slightly cohering in the upper half, linear, not winged but with a flattened, 2-pored apical appendage, the bases thickened and cordate: filaments free, nearly half as long as the anthers. *Style* as long as the anthers; stigma filiform.

PERAK: *King's Collector* 2242.—DISTRIB. Sumatra.

4. *ARGOSTEMMA YAPPII*, King n. sp. Glabrous; stem erect, unbranched, 6 to 12 inches high, succulent, when dry nearly as thick as a goose-quill at the base, tapering rapidly upwards. *Leaves* almost equal in size, thick (almost fleshy when fresh), elliptic, narrowed pretty equally at both ends, shining, upper surface pale-olivaceous, minutely scaly when dry, the lower olivaceous yellow, the midrib distinct and the 6 to 8 pairs of spreading main-nerves indistinct on both: length 2 to 3.5 in.; breadth .75 to 1.35 in., petiole .15 to .5 in., winged in its upper half. *Stipules* free, ovate-oblong, blunt, .4 to .7 in. long. *Cymes* terminal, trichotomous, on pedicels exceeding an inch in length, with a whorl of bracteoles at the apex and (like the branches) pink when fresh, branches often trichotomous. *Flowers* few, .5 in. long, on slender pedicels longer than themselves. *Calyx* campanulate; the lobes 5, triangular, acute, spreading, as long as the tube. *Corolla* more than twice as long as the calyx, green; its 5 lobes oblong-lanceolate, sub-acute, spreading, much longer than the short tube and slightly longer than the staminal cone. *Anthers* lanceolate, dehiscing longitudinally, coherent by the marginal wings of the connective, shortly apiculate, slightly shorter than the filiform style: stigma small.

PERAK: *Scortechini* 245, 1334; *Wray* (no number); *Yapp* 435.

Named in honour of Mr. R. H. Yapp who, as botanist, accompanied an exploring party sent to the Malayan Peninsula by the University of Cambridge.

5. *ARGOSTEMMA MEMBRANACEUM*, King n. sp. Glabrous; except for a few slender adpressed hairs on the upper surface of the leaves and on the calyx and pedicels. *Stem* erect, 8 to 10 in. high, thinner than a goose-quill, angled. *Leaves* sub-equal, few, scattered, large, thinly membranous, green when dry, slightly unequal-sided, the apex sub-acute; the base broadly ovate-cordate, main-nerves 4 or 5 pairs, the lower one branched on the side and spreading, the upper ascending, all distinct and pale on both surfaces, length 2.5 to 5 in.; breadth 1.5 to 3.5 in.; petiole about as long as the blade. *Cymes* axillary and terminal, condensed, 6- to 12-flowered, on long, slender, sometimes puberulous

peduncles, bearing 1 or 2 small leaf-like bracts near the apex, otherwise naked. *Calyx* broadly ovoid, about .1 in. long, puberulous, the tube broadly ovoid, the teeth narrowly lanceolate; pedicel nearly as long and also puberulous. *Corolla* unknown.

PENANG: *Curtis* 955.

6. *ARGOSTEMMA NUTANS*, King n. sp. *Stem* erect, 4 to 12 in. high, sometimes decumbent and rooting at the base, thicker than a crow-quill, bearing many scurfy but deciduous hairs. *Leaves* somewhat unequal but not conspicuously so, membranous, oblong, elliptic, or elliptic-oblong, occasionally slightly obovate, often more or less oblique, the apex acute, the base cuneate rarely rounded; upper surface dark olivaceous-brown, densely and uniformly adpressed glandular-hispidulous; the lower surface paler, coarsely pubescent on the midrib and nerves; almost glabrous between; main-nerves 5 to 8 pairs, curved, spreading and ascending, rather prominent on the lower surface only; length from 1.75 to 4 in.; breadth .75 to 2 in.; petioles .2 to .8 in., pubescent. *Stipules* ovate-lanceolate, .15 to .25 in. long, deciduous. *Umbels* cymose, terminal, usually solitary, on deciduous, pubescent peduncles, 1 to 2.5 in. long, surrounded at their bases by a whorl of lanceolate, small, pubescent bracteoles; many-flowered. *Flowers* .3 in. long, pendulous on pubescent pedicels 2 or 3 times as long as themselves. *Calyx* campanulate; the tube short, densely hairy outside: the lobes 5, ovate, sub-erect, longer than the tube, almost glabrous. *Corolla* slightly longer than the calyx, sparsely glandular-hairy outside; the 5 lobes membranous, reflexed, lanceolate, acute, longer than the *stamens*. *Stamens* 5, free, basifixed by the short flat filaments opposite the lobes of the corolla; *anthers* linear, dehiscent longitudinally, the connective coriaceous, with a short broad slightly notched apical appendage. *Style* filiform; stigma small, slightly exserted. *Capsules* erect, ovoid-globular, ridged, hairy, crowned by the short erect calyx-teeth, 2-celled, many-seeded, .05 in. in diam.

PERAK: *Wray* 843, 1296; *King's Collector* 585, 7190, 7802, 8060; *Scortechini* 157.

VAR. 1 *glabra*. Only a few inches high; all parts glabrous; *leaves* with shorter petioles and less narrowed at the base than in the type.

PERAK: *Scortechini* 297; *Wray* 2646; *King's Collector* 1985.

VAR. 2 *verticillata*. Only a few inches high; glabrous; *leaves* few (often only a single pair) lying flat on the ground: peduncle of umbel several times longer than the leaves; *umbels* often few-flowered.

PERAK: *Scortechini* 310; *King's Collector* 427, 1920.

7. *ARGOSTEMMA URTICIFOLIUM*, n. sp. King. *Stem* decumbent and rooting at the base, 8 to 12 in. long, thinner than a goose-quill and scurfy when dry. *Leaves* membranous, somewhat unequal in size;

broadly oblanceolate, shortly acuminate, cuneate and sometimes slightly unequal at the base; upper surface dark-brown with sparse, coarse, glandular, bulbous hairs, the midrib and main-nerves obscure; lower surface paler, with many glandular hairs on the bold midrib and slightly prominent 7 or 8 pairs of spreading, slightly curved main-nerves; the interspaces with a few similar hairs, minutely papillose; length of larger leaf of the pair 3 or 4 in.; of the smaller 2 to 2.5 in.; breadth of the larger 1.7 to 2 in.; of the smaller .9 to 1.2 in.; petioles from .3 to .7 in., glandular-pubescent. *Cyme* umbellate, terminal, solitary, 10- to 12-flowered, pedunculate; the peduncle 4-angled, scurfy like the stem and also glandular-hairy. *Flowers* on deciduously hairy pedicels, .3 to .4 in. long, bracteolate at the base. *Calyx* globular-campanulate, densely glandular-hairy outside; the teeth short, erect, acute, fleshy, glabrous inside; disk large tumid. *Corolla* unknown. *Capsule* globular, crowned by the small erect calyx-teeth and the disk hairy at first, but becoming glabrous; 2-celled, the placentas axile. *Seeds* numerous, triangular, pitted, black.

PERAK: *Scortechini*.

This appears to be the same species as one of Beccari's Sumatra plants (Herb. Becc. *Argostemma* 33).

8. *ARGOSTEMMA RIDLEYI*, King n. sp. Stem decumbent or prostrate rooting in its lower half, about as thick as a crow-quill, 6 or 8 in. long, 4-angled, softly rusty-pubescent. *Leaves* in each pair slightly unequal, membranous, narrowly oval or oval-oblong, acute, the base cuneate; upper surface darkly olivaceous, densely and coarsely pubescent on the midrib and nerves and with some scattered hairs on the spaces between; lower surface paler, the pubescence on the midrib and 5 or 6 pairs of main-nerves not so coarse as on the upper, the reticulations with a single row of hairs, the areolæ glabrous, but with minute white scales; length .8 to 1.8 in.; breadth .4 to .8 in.; petioles .15 to .6 in., densely and coarsely pubescent. *Stipules* lanceolate to broadly ovate, their apices acute and bifid, about .2 in. long. *Cyme* terminal, solitary, pedunculate, longer than the leaves, umbellately 2-3-flowered; rusty-pubescent in all its parts; peduncle .75 to 1.5 in. long, bearing a whorl of bracteoles about the middle and another at the base of the pedicels. *Flowers* .4 in. long, their pedicels much longer. *Calyx* campanulate with 5 broad spreading ovate-acute lobes slightly longer than the tube. *Corolla* unknown. *Capsules* obconic, crowned by the prominent calyx-teeth, .15 in. in diam., pubescent. *Seeds* numerous, small.

MALACCA: *Ridley* 10110.

9. *ARGOSTEMMA UNIFOLIUM*, Benn. Pl. Jav. Rar. 94. Rhizome short, fleshy; whole plant glabrous, succulent, 6 to 8 in. high. *Stem*

simple, erect, bearing, about or below the middle, a pair of lanceolate bracts about .2 in. to .4 in. long and, at the base of the peduncle, a whorl composed of a single pair of very unequal thin membranous (when dry) leaves and a pair of stipules; the larger leaf broadly ovate, shortly acuminate, the base rounded or cordate; when dry the upper surface dark brown, the midrib broad and channelled, the nerves elevated; lower surface pale brown, the midrib and 5 or 6 pairs of spreading slightly curved nerves slightly prominent; length 3 to 6 in.; breadth 1.5 to 3 in.; petiole .4 to .8 in. Smaller leaf sessile, ovate-lanceolate, acute, 1-nerved, .2 to .5 in. long. *Stipules* similar to smaller leaf. *Cymes* terminal, simply or compoundly and laxly *umbellate*, few- or many-flowered; peduncle slender, 1.5 to 8 in. long, with a whorl of narrow bracteoles at the origins of the branches. *Flowers* narrow in bud, .25 in. long; their slender pedicels slightly longer, sometimes lengthening in fruit. *Calyx* under .1 in. long, campanulate, with broad, blunt, thick, short, spreading lobes. *Corolla* narrow in bud, more than twice as long as the calyx; its 5 lanceolate lobes slightly shorter than the erect staminal cone. *Anthers* lanceolate, the cells narrowly linear, cordate at the base, edged by the cohering wings formed by the connective and surmounted by membranous, flat, apical appendage longer than themselves: filaments short, thick, curved. *Capsule* hemispheric, crowned by the rather large calyx, subglabrous, .1 in. in diam., 2-celled, dehiscence circumscissile. Hook. fil. Fl. Br. Ind. III. 45.

JOHOR: *Ridley* 3730. PENANG: *King*; *Curtis* 990; *King's Collector* 2276. MALACCA: *Maingay* (K.D. 895).

10. ARGOSTEMMA UNIFOLIOLIDE, *King* n. sp. Rhizome woody: stem fleshy when fresh, glabrous, thinner than a goose-quill and angled when dry, 3 to 7 in. high, bearing one or more pairs of lanceolate, glabrous bracts about .25 in. long, and at the base of the peduncle a pair of very unequal membranous leaves and a pair of stipules all in a whorl; the longer leaf sessile, broadly ovate or ovate-rotund, shortly acuminate, the base rounded or cordate; upper surface dark brown when dry, with sparse, coarse, glandular hairs or (in var. *glabra*) glabrous; lower surface pale brown, the broad midrib and main-nerves sparsely glandular-pubescent, otherwise glabrous; main-nerves 9 to 14 pairs, curved, spreading, slightly prominent on both surfaces (when dry) but chiefly on the lower length 5.5 to 10 in.; breadth 3.5 to 6.5 in.; smaller leaf sessile, narrowly ovate, acute, about .5 in. long; the stipules similar but usually narrower. Inflorescence terminal, solitary, pedunculate, paniculately umbellulate, lax, usually many flowered; peduncle and branches glabrous, fleshy when fresh and somewhat stout; bracteoles in whorls (usually of 4), oblong obtuse, concave, connate at the base, about .3 in. long. *Flowers*

rather broad in bud, .2 to .25 in. (sometimes .4 in.) long, the pedicels varying in length, the ultimate umbellules with rather large, broad, blunt bracteoles at the base. *Calyx* under .1 in. long, campanulate, the lobes 5, broad, blunt, thick, spreading. *Corolla* several times longer than the calyx, broadly ovate and angled in bud; the 5 lobes ovate, acute, boldly 1-nerved, longer than the cone of anthers, spreading or reflexed. *Anthers* almost sessile, narrowly linear-lanceolate, the connectival margin narrow and the apicular appendage short. *Capsules* somewhat fleshy, hemispheric, .1 in. in diam., crowned by the small calyx, 2-celled, the dehiscence circumscissile.

PERAK: at elevation of from 2,500 to 4,500 feet; *Scortechini* 282, 384; *Wray* 410.

VAR. *glabra*. *Leaves* glabrous on both surfaces.

PERAK: *Scortechini* 412, 1204; *Wray* 2814; *King's Collector* 5064; *Curtis* 3146.

This differs from *A. unifolium* in its corolla being broadly ovate in bud and having ovate, boldly 1-nerved lobes, in having its anthers almost sessile, with very long cells and short apical appendages. This has also larger leaves with more nerves which are sometimes hairy; its stems are also shorter and stouter.

11. ARGOSTEMMA SPINULOSUM, Clarke in Hook. fil. Fl. Br. Ind. III. 46. *Stem* only 3 to 8 inches long, nearly as thick as a goose-quill, decumbent and rooting at the base, obscurely 4-angled; with a few deciduous flexuose hairs. *Leaves* crowded, subcoriaceous, very unequal, the larger of each pair oblong-ob lanceolate, acute or acuminate, slightly narrowed from above the middle to the somewhat unequally-sided base; upper surface olivaceous, with a few thick, scattered hairs chiefly on the broad depressed midrib and near the edges, otherwise glabrous; the lower pale brown with many thinner hairs on the prominently raised broad midrib and on the nerves, and a few on the interspaces; main-nerves 10 to 14 pairs, curved, spreading, distinct on the lower surface, faint on the upper; length 2.5 to 5 in.; breadth 1 to 1.75 in.; petiole .2 to .5 in. Smaller leaf lanceolate to oblong, sessile, 3- to 5-nerved, .5 to .75 in. long. *Stipules* like the smaller leaves but shorter and with only one nerve. *Umbels* terminal, simple or compound, solitary or several, all on long peduncles shorter than the leaves, sometimes united at their bases; succulent, few-flowered, glabrous, 1.5 to 2 in. long; umbels or umbellules 3- or 4-flowered. *Flowers* .35 to .4 in. long, on slender pedicels of about the same length, with lanceolate scarious bracteoles at their bases, glabrous. *Calyx* campanulate; the limb with 5 triangular acute spreading lobes shorter than the tube. *Corolla* about twice as long as the calyx; its lobes broadly lanceolate, acuminate, shorter than the erect staminal cone: filaments short, curved; *anthers* linear-oblong,

dehiscing longitudinally; the connective with long linear apical process. *Capsule* obconic, smooth, .2 in. long, crowned by the calyx, 2-celled, 2-seeded. *Seeds* minute, dark brown.

PERAK: *Scortechini* 454, 500; *Ridley* 2920; *Wray* 463, 1083, 2910, 2958, 3936; *King's Collector* 2789, 2892, 7520. SELANGOR: *Ridley* 7409.

This species is closely allied to *A. Elatostemma*. It has, however, a shorter stem and larger fewer leaves.

12. ARGOSTEMMA ELATOSTEMMA, Hook. fil. Fl. Br. Ind. III. 45. *Stem* thinner than a goose-quill, 4 to 12 in. long, decumbent and rooting at the lower nodes, deciduously scurfy-hairy, sometimes becoming sub-glabrous. *Leaves* thickly membranous, very unequal; the longer one of the pair somewhat oblique, oblong-lanceolate; the apex broad or sub-acute, sometimes shortly apiculate, more or less narrowed from a little above the middle to the often somewhat unequally-sided or obliquely-cordate base, the edges not ciliate; upper surface glabrous or nearly so, the slightly depressed midrib and main-nerves sometimes puberulous; the lower surface minutely scaly, rusty adpressed-pubescent on the prominent midrib, reticulations, and 10 to 12 pairs (only 7 or 8 in var.) of slightly curved spreading main-nerves; length 1.25 to 2.25 in.; (shorter in var.); breadth .75 to 1 in.; petioles unequal, .15 to .2 in long, scurfy-pubescent; the smaller leaf ovate-lanceolate (broadly ovate in var.) sessile, .15 to .2 in. long, with 2 to 4 pairs of nerves. *Stipules* about the same in size and shape as the smaller leaves. *Corymbs* terminal, solitary, pedunculate, few-flowered, usually shorter than the leaves; the peduncles slender, minutely pubescent or sub-glabrous; bracteoles at the forks, minute. *Flowers* .4 in. long, on slender sometimes puberulous pedicels about as long as themselves. *Calyx* .1 in. long, pubescent, campanulate, with 5 triangular, spreading, acute lobes. *Corolla* white, glabrous, with 5 long lanceolate much reflexed lobes. *Anthers* linear-lanceolate, cohering by the narrow wings and long terminal appendage of the connective, erect, dehiscing by long vertical slits. *Style* long, slender, cylindric: stigma small, slightly exserted beyond the narrow staminal cone. *Capsule* pyriform, glabrous, crowned by the calyx-teeth, .2 in. long.

PENANG: *Hullett* 195; *Curtis* 962, 2250; *King's Collector* 1605, 1752. SINGAPORE: *Lobb* 295. MALACCA: *Griffith* (K.D.) 2876. PERAK: *Scortechini*; *Wray* 3334; *King's Collector* 2131.

VAR. *obovata*, King. *Leaves* obovate, minutely apiculate, the base obliquely cordate: upper surface with a few scattered, short, thick hairs, length .9 to 1.4 in.; breadth .5 to .75 in. *Corymb* 2- to 4-flowered, its peduncle pubescent, with a whorl of minute bracts near its apex.

PERAK: *King's Collector* 10815.

13. ARGOSTEMMA INVOLUCRATUM, Hemsl. in Hook. Icon. t. 1556. Stems thinner than a goose-quill, succulent, decumbent, 4 to 12 in. long with partially deciduous, long, flexuose, white hairs. Leaves membranous, very unequal in size, the larger of the pair obliquely and narrowly lanceolate or oblanceolate (linear-ovate-lanceolate or ovate in vars.) more or less narrowed to the slightly unequal base; both surfaces greenish or olivaceous-brown when dry, the lower paler, the upper more or less bulbous-strigose especially on the midrib and nerves: the under hispidulous, sometimes pitted, the edges shortly ciliate, main-nerves 7 or 8 pairs (in var., glabrous sometimes only 5 or 6 pairs) curved, spreading or ascending, slightly conspicuous when dry; length 1.25 to 3 in.; breadth .5 to 1.25 in.; petiole .1 to .4 in.; the smaller leaf ovate or ovate-lanceolate, 3-nerved, sessile, from .1 to .4 in. long. Stipules like the smaller leaves, but not cordate, free. Flowers .5 in. long, from 1 to 3 in a multibracteolate pubescent terminal raceme shorter than the leaves; the pedicels about as long as the flowers, hairy. Calyx densely hairy; the tube short; the 5 lobes many times longer, lanceolate, acuminate, spreading. Corolla with lobes like the calyx but slightly broader and less hairy, not reflexed. Stamens 5, erect; the filaments short, thick, curved, dorsifixed near the base of the linear-lanceolate, acuminate, apiculate, but not winged, longitudinally dehiscent anthers. Capsule small, compressed, obovoid, crowned by the long spreading calyx-teeth, 2-celled, 2-seeded: seeds compressed, brown.

PERAK: King's Collector 2204, 2820, 8062. PENANG: Ridley 10273; Curtis 342, 3148; Gunong Tahan, Yapp.

VAR. *mollis*, King. Leaves usually more than 1 in. broad, obliquely ovate-lanceolate, acuminate, the under surfaces and inflorescence with soft flexuose rather coarse hair.

PERAK: Ridley 2927; King's Collector 2898; Scortechini 38.

VAR. *glabrescens*, King. Leaves linear-lanceolate to oblanceolate, rarely ovate, glabrous except for a few stiff strigose hairs on the midrib and main-nerves; .9 to 2 in. long.

PERAK: Scortechini 303, 455; Ridley 9763; King's Collector 2714; Wray 696.

The bracteoles on the inflorescence often form an involucre at the bases of the pedicels, hence the specific name.

14. ARGOSTEMMA CURTISII, King n. sp. All parts quite glabrous; stems succulent, decumbent, glabrous, reddish when fresh, rooting in the lower part, thicker than a crow-quill when dry; 4 to 8 in. long. Larger leaves succulent, unequal; the larger linear-elliptic, much attenuated to either end, the apex gradually acuminate, the base more abruptly so; both surfaces olivaceous when dry, the lower the paler; main-nerves

invisible; the midrib depressed on the upper surface, prominent on the lower; length 1.25 to 2.75 in.; breadth .1 to .4 in.; petiole .1 to .25 in.; the smaller leaves linear, .3 in. long. *Stipules* like the smaller leaves but somewhat shorter and broader. *Cymes* terminal, pedunculate, shorter than the leaves, 2-4-flowered. *Peduncles* slender, longer than the pedicels, with one or two whorls of small lanceolate bracteoles; pedicels longer than the flowers, bracteolate at the base. *Flowers* .35 in. long, white. *Calyx* campanulate; with 5 triangular, acute, spreading teeth as long as the short tube. *Corolla* with 5 spreading lanceolate, acuminate lobes twice as long as the calyx. *Stamens* 5 in an erect cone; the filaments short, thick, curved; *anthers* linear-lanceolate; the connective margined and apiculate.

PERAK: *Scortechini* 1890. PENANG: *Curtis* 3332.

15. ARGOSTEMMA SUBCRASSUM, King n. sp. A glabrous herb 12 to 18 in. high; *stems* succulent, thinner than a goose-quill when dry, little branched, decumbent near the base, ascending, covered with a layer of smooth, oblong scales. *Leaves* very unequal, membranous; the larger of each pair membranous when dry, succulent when fresh; elliptic or oblanceolate-oblong, somewhat oblique, acuminate, narrowed at the base; both surfaces olivaceous-brown when dry, the lower the paler; main-nerves 7 to 12 pairs, ascending, much curved, faint on both surfaces when dry; the midrib raised on the upper surface, flat and broad on the lower; length 3.5 to 7 in.; breadth 1 to 1.5 in.; petioles .1 to .3 in.; slightly winged. *Smaller leaf* ovate-cordate, sessile, only .1 to .25 in. long. *Stipules* like the small leaves but smaller. *Cymes* with few or many umbellate branches, the ultimate branches few-flowered, lax; the branches with small lanceolate bracteoles at the forks. *Flowers* .4 or .5 in. long, on slender pedicels as long as themselves and minutely bracteolate at the base. *Calyx-tube* short, campanulate, its 5 lobes thick, short, broadly ovate, blunt or acute, spreading. *Corolla* three times as long as the calyx; its 5 lobes lanceolate, .25 in. long, spreading. *Stamens* conjoined in an erect cone longer than the corolla; *anthers* linear-lanceolate, the connective with a long terminal process half as long as the anther; filaments short, thick, curved, dorsi-fixed near the base of the anther. *Capsule* obovoid-globular, truncate, crowned by the calyx, smooth, 2-celled, many-seeded.

PERAK: *Scortechini* 1203, 1912; *King's Collector* 10154; *Ridley* 9762. SELANGOR: *Ridley* 7408.

16. ARGOSTEMMA PERAKENSIS, King n. sp. *Stem* erect, unbranched, with the peduncle 8 in. high, thicker than a crow-quill, bearing a few scattered coarse hairs near the base, otherwise glabrous. *Leaves* 2 pairs, thinly membranous, very unequal; the larger oblanceolate-elliptic,

the apex acuminate, the base much narrowed; both surfaces dirty olivaceous when dry, glabrous; main-nerves 5 or 6 pairs, ascending, faint; length 2.5 to 3.5 in.; breadth 1.2 to 1.5 in.; petiole .4 in.; winged near the apex: smaller leaf about .1 in. long, lanceolate, sessile. *Peduncle* terminal, erect, 3 in. long; minutely hairy, with a whorl of lanceolate bracts near its base and another .2 in. long at the base of the 10- to 12-flowered terminal umbel. *Flower-pedicels* about .3 in. long, slightly unequal, flattened, sub-glabrous. *Calyx* with a broadly ovate-rotund puberulous tube .1 in. long, and 5 minute radiating teeth. *Corolla* unknown.

PERAK: Ridley 110.

17. ARGOSTEMMA OBLONGUM, King n. sp. *Stem* 6 to 15 in. high, slightly branched, half as thick as a goose-quill, rooting in its lower part, covered with scaly deciduous pubescence. *Leaves* membranous, very unequal; the larger of each pair elliptic to oblong, acute, the base rounded and slightly and obliquely cordate; upper surface brownish, olivaceous, everywhere glabrous, the midrib depressed; the lower pale, glabrous except the midrib and 6 to 8 pairs of curved spreading slightly prominent main-nerves; length 2 to 3 in.; breadth 1 to 1.35 in.; petiole .1 to .2 in.; smaller leaf sessile, ovate-oblong or ovate-cordate, .25 to .4 in. long: *stipules* like the smaller leaf but not so large. *Cymes* few-flowered, solitary, pedunculate, terminal or from the upper axil, shorter than the leaves, with very few, shortly pubescent branches, often with a whorl of lanceolate bracts below the middle of the peduncle and at the base of the umbels. *Flowers* .25 in. long, on pubescent pedicels of about the same length. *Calyx* pubescent, campanulate, with 5 short, triangular, acute, spreading teeth. *Corolla* twice as long as the calyx, slightly hairy outside; the lobes broadly lanceolate, nerved, reflexed. *Stamens* 5, coherent in an erect cone slightly shorter than the corolla. *Anthers* dehiscing longitudinally; the connective forming marginal wings and a long flat apical process slightly recurved at the point; filaments short, curved, thick, attached to the back of the anther near its base. *Capsule* sub-globular, crowned by the slightly enlarged calyx-lobes, minutely pubescent, .1 in. in diam. *Seeds* numerous, angled, black, large in size for the genus.

PERAK: King's Collector 907, 10261, 10675; Scortechini 159. SELANGOR: Ridley 7410. JOHOR: King.

18. ARGOSTEMMA OPHIRENSE, Maing. ex Hook. fl. Fl. Ind. III. 45. *Stem* ascending, rooting at the base, little-branched, minutely nodose, succulent, terete and thicker than a crow-quill when dry, deciduously scurfy-hairy, 4 to 10 in. high. *Leaves* sub-coriaceous, glabrous but occasionally with a few scattered hairs on the midrib, very unequal, the

larger of each pair oblanceolate or elliptic-oblanceolate or elliptic, often more or less oblique, acuminate or acute, narrowed to the base; upper surface olivaceous when dry; the lower pale brown, sometimes scurfily puberulous on the short midrib and nerves; main-nerves 5 to 8 pairs, curved, ascending, obscure on the upper but slightly prominent on the lower surface when dry; length 2 to 3.5 in.; breadth .7 to 1.25 in.; petiole .1 to .35 in. *Smaller leaf* of the pair obliquely ovate-cordate, or lanceolate, acute, sessile, .1 to .2 in. long. *Stipules* like the small leaves but not so large. *Cymes* terminal, spreading, sometimes branched, solitary, usually shorter than, but sometimes as long as the leaves, glabrous, with whorls of small lanceolate or ovate bracteoles in the lower part of the 1 to 2 in. long peduncle and at the forks of the branches. *Flowers* .4 in. long; their pedicels about as long and minutely bracteolate at the base. *Calyx* pubescent, short, campanulate, with 5 broadly ovate spreading lobes half as long as the tube. *Corolla* more than twice as long as the calyx, glabrous; its 5 lobes lanceolate, shorter than the stamens, their edges waved. *Anthers* lanceolate, dehiscing longitudinally; connective forming narrow marginal wings and a long apical appendage. *Style* filiform, slightly exserted; stigma clavate. *Capsule* oboeonic, crowned by the broadly toothed calyx, .15 in. in diam.; seeds numerous, minute.

MALACCA: Griffith (K.D.); Maingay (K.D.) 897; Ridley 3210. PERAK: Wray 2197.—DISTRIB. Borneo.

19. ARGOSTEMMA WRAYI, King n. sp. *Stem* procumbent, rooting at the nodes in the lower half, when dry 4-angled and somewhat thicker than a crow-quill, sparsely hairy in the upper, but glabrous in the lower part. *Leaves* of the pairs very unequal, membranous; the larger lanceolate, acuminate, narrowed and slightly unequal at the base; upper surface, when dry, dark olivaceous, glabrous, the midrib broad and depressed, the main-nerves obscure; under surface pale, reticulate, sparsely pubescent on the midrib and 6 or 7 pairs of curved ascending rather distinct main-nerves; length 2 to 3 in.; breadth .6 to .9 in.; petioles .3 to .4 in., puberulous: the smaller leaf sessile, ovate-lanceolate, .15 to .2 in. long. *Stipules* like the small leaf but not so large. *Cyme* terminal, shorter than the leaves, pedunculate, dichotomous, few-flowered. *Peduncle* about .5 in. long, glabrous, with a whorl of lanceolate glabrous bracteoles at its division into the 2 short branches. *Flowers* .25 in. long; their pedicels about as long, bracteolate at the base, pubescent. *Calyx* campanulate, puberulous, lobes deeply-lanceolate, acuminate, spreading, longer than the tube. *Corolla* nearly twice as long as the calyx, glabrous: its 5 lobes lanceolate, slightly longer than the staminal cone. *Anthers* linear-lanceolate, coherent by the narrow marginal wing

of the connective, the apex with a long flat process, stigma oblong, about as long as the anthers.

PERAK: elevation 3400 feet; *Wray* 1012.

20. ARGOSTEMMA HOOKERI, King n. sp. Stem slightly thicker than a crow-quill, decumbent and rooting in its lower part, obscurely 4-angled, 6 to 12 in. long, covered with long, soft, pale, flexuose hairs. *Leaves* thickly membranous, very unequal; the larger of each pair lanceolate, ovate-lanceolate or oblong, sub-acute or obtuse, somewhat narrowed to the unequal-sided base; upper surface (when dry) olivaceous, with a few scattered, thick, adpressed, pale hairs near the edges and on the midrib; the lower pale, glaucous; the broad midrib and somewhat prominent 5 or 6 pairs of curved spreading nerves scurfy and sparsely pubescent; length .75 to 1.35 in.; breadth .35 to .6 in.; petiole .1 to .2 in. *Smaller leaf* ovate-lanceolate, cordate, sessile; *stipules* like the smaller leaves. *Cymes* umbellately 2-3-flowered, terminal, solitary, on slender, sparsely pubescent peduncles, about 1.5 in. long, and with a whorl of narrow bracteoles about the middle. *Flowers* .3 in. long; their pedicels puberulous and bracteolate at the base. *Calyx* widely campanulate, tomentose outside, the 5 lobes broadly triangular, spreading, shorter than the tube. *Corolla* twice as long as the calyx, white, sparsely hairy outside; the 5 deep lobes lanceolate, acuminate, spreading or reflexed. *Anthers* lightly cohering by their exalate edges into an erect cone, lanceolate, the base acute and entire, the apex with a long, flat, minutely bifid appendage. *Style* filiform, longer than the anthers, stigma clavate. *Capsule* obconic, very hairy, .15 in. in diam. crowned by erect calyx-lobes. *A. parvifolium*, Hook. fl. (not of Benn.) Fl. Br. Ind. III. 45.

PENANG: *King's Collector* 1747, 1756. JOHOR: *King*.

21. ARGOSTEMMA BICOLOR, King n. sp. Whole plant 3 or 4 in. high. *Stem* erect, simple, as thick as a crow-quill, pubescent. *Leaves* thickly membranous, very unequal; the larger of each pair subsessile, elliptic or oblong, tapering to the sub-acute apex and to the oblique, minutely cordate base; when dry the upper surface pale-olivaceous and bearing a few adpressed hairs on the midrib and near the margins; lower surface pale-yellowish, minutely hairy on the midrib and 5 or 6 pairs of spreading, little-curved main-nerves; length 1.5 to 2.15 in.; breadth .65 to .85 in.; smaller leaf only .25 to .3 in. long, ovate, sessile. *Stipules* broad, rounded, shorter than the smaller leaf. *Peduncles* axillary or terminal, as long as or longer than the leaves, erect, adpressed-pubescent, bearing a whorl of ovate-lanceolate bracts at or below the middle and another at the base of the terminal 3- to 6-flowered (sometimes branched) umbel. *Flower-pedicels* .2 to .25 in. long, densely pubescent like the calyx.

Flowers 3 in. long. *Calyx* rotate, only .05 in. long; its lobes triangular, spreading. *Corolla* five times as long as the calyx, glabrous, rotate, its 5 lobes broadly oblong-lanceolate, sub-acute, spreading, puberulous. *Anthers* glabrous.

PERAK: *Curtis* (without number).

12. HEDYOTIS, Linn.

Erect, decumbent or climbing herbs, or undershrubs, with 4-angled or terete stems, the stipules free or united with the petioles to form a cup, often bristly on the edge. *Leaves* sometimes whorled, often with bold nerves. *Flowers* in terminal or axillary, often much condensed cymes, 4-merous. *Calyx* with a globose ovoid or turbinate tube, and 4 acute persistent lobes without interposed teeth. *Corolla* white or lilac, funnel-shaped or campanulate; the lobes 4, valvate, ovate to linear; the throat naked or hairy. *Stamens* 4, in the tube or throat of the corolla; *anthers* dorsifixed, oblong or linear. *Disk* fleshy, inconspicuous. *Ovary* two-celled, many-ovuled, the style filiform, stigma bifid or bilobed, rarely entire; *ovules* on sessile or pedicelled placentas attached to the septum at or below the middle. *Fruit* small, membranous coriaceous or crustaceous, septi- or loculi-cidal, or splitting into two separable or united, 2- or many-seeded cocci, or indehiscent. *Seeds* plano-convex, or angled, granulate or pitted, rarely winged; embryo sub-cylindric, in horny albumen, radical short.—DISTRIB. Species about 100, chiefly Tropical Asiatic.

Cymes pedunculate, umbellate or capitate, terminal or axillary:—

Scandent:—

Cymes umbellate, collected in a terminal leafy panicle; flowers distinctly pedicelled ...

1. *H. mollis*.

Cymes capitate, collected in a terminal leafy panicle; flowers on very short pedicels:—

All parts pubescent; flowers 1 in. long ...

2. *H. Prainiana*.

All parts glabrous; flowers 15 in. long ...

3. *H. capitellata*.

Erect or diffuse, herbaceous:—

Cymes capitate, solitary or in small axillary panicles shorter than the leaves; pubescent herbs ...

4. *H. vestita*.

Cymes umbellate, in small trichotomous axillary branches shorter than the leaves; glabrous erect herbs ...

5. *H. glabra*.

Cymes capitate, on slender axillary peduncles longer than the leaves; puberulous decumbent herbs ...

6. *H. stipulata*.

Erect woody glabrous shrubs:—

Cymes capitate, solitary, on stout peduncles much longer than the leaves ...

7. *H. peduncularis*.

- Cymes in terminal little-branched shortly pedunculate compound umbels ... 8. *H. Maingayi*.
- Cymes sessile, axillary, dense, capitate :—
- Leaves elliptic to ovate-lanceolate, 2·5 to 6 in. long and 1·5 to 3 in. broad (about twice as long as broad) :—
- Flowers 4-merous, not glaucous beneath :—
- Leaves and corolla glabrous; shrubby, with herbaceous branches ... 9. *H. congesta*.
- Leaves rounded or abruptly narrowed at the base; main-nerves curved; flowers only 1 in. long ... 10. *H. macrophylla*.
- Leaves gradually narrowed to the base; nerves not curved; flowers 1·5 in. long ... 11. *H. Kunstleri*.
- Leaves narrowly elliptic to elliptic-lanceolate, 1 to 2 in. long, 3 to 8 in. broad (about three times longer than broad) :—
- Stipules with numerous filiform bristles, much longer than the sheath; leaves subsessile, with broad bases, their main-nerves 4 or 5 pairs, very faint ... 12. *H. connata*.
- Stipules with a few bristles, not much longer than the sheath; leaves at the base petiolate :—
- Main-nerves of leaves 4 to 6 pairs, straight, oblique, very prominent ... 13. *H. Auricularia*.
- Main nerves of leaves 3 or 4 pairs, curved, faint ... 14. *H. Havilandi*.
- Leaves linear-oblong or linear, many times longer than broad :—
- Leaves glabrous, sessile :—
- Leaves glabrous beneath; flowers 1·5 in. long; calyx obovoid-campanulate with 4 lanceolate-ovate spreading lobes; lobes of corolla short with thickened apices; anthers broadly ovate ... 15. *H. tenelliflora*.
- Leaves not glaucous beneath; flowers 2 in. long; calyx tubular-campanulate, with 4 ovate ciliate suberect lobes; lobes of corolla narrowly ovate, sub-acute; anthers oblong ... 16. *H. nitida*.
- Leaves with weak hispid hairs on the upper surface, glabrous on the lower, sessile; capsule sparsely pubescent ... 17. *H. piniifolia*.
- Leaves with both surfaces slightly scaberulous, shortly petiolate; capsule coarsely pubescent ... 18. *H. hispida*.

1. *HEDYOTIS MOLLIS*, Wall. Cat. 859. Scandent; the older stems terete, thickened towards the nodes, the younger 4-angled, grooved, softly but minutely pubescent like the branches of the inflorescence. *Leaves* membranous, lanceolate to elliptic-lanceolate, shortly acuminate, the base cuneate; upper surface olivaceous when dry, glabrous or subglabrous, the midrib often puberulous; lower surface paler and puberulous; main-nerves 3 or 4 pairs, ascending obliquely, little curved, slightly depressed on the upper and prominent on the lower surface like

the midrib; length 1.75 to 3.5 in.; breadth .6 to 1.15 in.; petiole .05 in. *Stipules* pubescent, short, broad, truncate, the upper edge bearing 3 or 4 stout black erect bristles. *Inflorescence* 1 to 1.75 in. long, terminal and from the upper leaf-axils, paniculate; the branches diverging, each with a minute linear bracteole at its base and at its apex a lax few-flowered umbel .4 in. in diam. *Flowers* about .15 in. long, their pedicels about as long or shorter. *Calyx* narrowly campanulate, glabrous; the mouth with 4 rather broad triangular teeth. *Corolla* about twice as long as the calyx, glabrous; the tube funnel-shaped; the mouth deeply divided into 4 oblong blunt teeth. *Capsules* narrowly obovoid, glabrous, crowned by the small spreading calyx-teeth, faintly 2-grooved, under .7 in. long. *Seeds* several in each cell, dark brown. G. Don Gen. Syst. III. 527; Hook fl. Fl. Br. Ind. III. 57.

PERAK: *Scortechini* 55; *King's Collector* 2704. PENANG: *Curtis* 1096.

VAR. *laxa*. *Inflorescence* 1.5 to 3 in. long, much more lax than in the type; flower-pedicels slender, often .15 in. long; flowers .2 in. long.

PERAK: *King's Collector* 2926. PENANG: *Curtis* 1096.

2. *HEDYOTIS PRAINIANA*, King n. sp. Scandent, at first green but ultimately olivaceous-brown when dry; young branches thinner than a goose-quill, broadly two-grooved, very slightly angled, uniformly clothed with short yellowish pubescence. *Leaves* thickly membranous, broadly lanceolate or narrowly elliptic, acute, the base narrowed into the petiole; both surfaces minutely pubescent; midrib prominent; main-nerves 4 or 5 pairs, rather straight, ascending; length 2 to 4 in.; breadth 1 to 1.5 in.; petioles .3 to .8 in. long, tomentose; the leaves of the inflorescence becoming smaller and with shorter petioles upwards, the uppermost pair sessile. *Stipules* broad at the base, the mouth with numerous long linear or lanceolate unequal lobes. *Inflorescence* a narrow panicle 6 to 15 in. long, with short simple or ternate spreading umbel-bearing branches .75 to 2.5 in. long, everywhere clothed with rather dense yellowish pubescence. *Umbels* capituliform, .3 to .5 in. in diam. when dry, bi-bracteolate at the base, 10- to 12-flowered. *Flowers* rather more than .1 in. long, on short pedicels about as long as their acute bracteoles. *Calyx* narrowly campanulate, with 4 long erect lanceolate lobes, pubescent outside like the corolla. *Corolla* slightly exserted, tubular, with 4 short broad teeth. *Stamens* 4, included; anthers narrowly ovate, filaments short. Fruit oblong, pubescent, the cocci plano-convex, each containing a large placenta and 2 or 3 large compressed seeds.

PENANG: *Curtis* 977.

Allied to *H. capitellata*, Wall., but pubescent and with flowers only half as large. *Scortechini* (Herb. 34) collected in Perak specimens in advanced fruit which may belong to this.

3. *HEDYOTIS CAPITELLATA*, Wall. Cat. 837 (in part). Scandent, glabrous, greenish when dry; young branches slender, 4-angled, the older usually terete. *Leaves* thickly membranous, lanceolate or elliptic-lanceolate, acuminate, the base more or less cuneate; lower surface darker than the upper; main-nerves 3 or 4 pairs, ascending, very little curved, rather prominent (like the midrib) beneath length 1·5 to 2·75 in.; breadth ·75 to 1·25 in.; petiole ·1 to ·15 in. *Stipules* short, broad, with long coarse teeth. *Inflorescence* paniced, pedunculate, mostly terminal; the primary branches trichotomous; the secondary branches divaricate, each bearing a linear reflexed bracteole at its base and at its apex a dense capitulum of flowers. *Flowers* ·4 in. long, sub-sessile. *Calyx* a little more than ·1 in. long, campanulate, ribbed; the mouth with 4 broad, ovate, lanceolate, acute spreading teeth, with a few hairs on their edges. *Corolla* tubular in bud, deeply divided into 4 narrowly oblong blunt spreading lobes, glabrous outside but with many coarse hairs inside. *Capsule* narrowly obovoid, sub-compressed, grooved, glabrous, a little more than ·1 in. long. *Seeds* several in each cell, black. G. Don Gen. Syst. III. 527; Kurz in Journ. As. Soc. Beng. 1877, II. 135 (excl. var. 7). Hook. fil. Fl. Br. Ind. III. 57. *Oldenlandia rubioides*, Miq. Fl. Ind. Bat. II. 353. *H. Finlaysoniana*, Wall. Cat. 6189.

In all the provinces; common.—DISTRIB. Malay Archipelago.

4. *HEDYOTIS VESTITA*, R. Br. in Wall. Cat. 847. A diffuse little-branched herb 1 to 4 feet long, all parts, except the upper surfaces of the leaves, softly pubescent; stems and branches slender, 4-angled and 4-grooved when dry. *Leaves* membranous, narrowly elliptic-lanceolate, more or less acuminate, the base narrowed; upper surface sparsely adpressed-pubescent; main-nerves 5 or 6 pairs, ascending obliquely, almost straight, depressed on the upper and prominent on the lower surface; length 2 to 3·5 in.; breadth ·6 to 1 in.; petiole ·15 to ·25 in.; *Stipules* short, broad, crowned by one to three bristly or subulate processes. *Inflorescence* axillary, consisting of few-flowered, head-like umbellate cymes, on simple peduncles or in small panicles, bracteolate. *Flowers* about ·05 in. long, sessile or sub-sessile. *Calyx* cupular, with 4 deltoid or lanceolate, spreading, narrow acuminate lobes. *Corolla* blue or violet, funnel-shaped, hairy externally and in the throat, its lobes recurved. *Fruit* dry, sub-indehiscent, broadly turbinate or obovate, less than ·05 in. long; *seeds* numerous, compressed. G. Don Gen. Syst. III. 526; Hook. fil. Fl. Br. Ind. III. 58. *H. costata*, Kurz in Journ. As. Soc. 1877, II. 135 (not of R. Br.) *H. cœrulea*, Korth. in Ned. Kruidk. Arch. II. 160. *H. capituliflora*, Miq. Fl. Ind. Bat. II. 183. *Metabolus cœruleus*, Bl. Bijdr. 992; DC. Prod. IV. 435. *M. lineatus*, Bartl. in DC. Prod. l.c. *Spermacoe costata*, Roxb. Fl. Beng. 10; Fl. Ind. I. 370.

In all the Provinces.—DISTRIB. Sub-tropical Himalaya; Assam; Malay Archipelago.

5. *HEDYOTIS GLABRA*, R. Br. Wall. Cat. 848. A glabrous erect herb, 18 to 24 in. high; stems woody at the base, terete even when dry, slightly striate, thicker than a crow-quill, somewhat smaller near the nodes. *Leaves* linear-lanceolate tapering much to each end, when dry pale yellowish-olivaceous and with recurved edges; main-nerves 3 or 4 pairs, straight, oblique, ascending, prominent like the midrib on the lower and depressed on the upper surface, length 1·75 to 3 in.; breadth ·15 to ·4 in.; petiole ·1 to ·15 in. long. *Stipules* adnate to the petioles to form a campanulate cup with truncate mouth bearing a few long bristles. *Cymes* in small trichotomous axillary pedunculate panicles from ·35 to 1·25 in. long, minutely puberulous, and minutely bracteolate. *Flowers* less than ·1 in. long, on short pedicels of varying length. *Calyx* narrowly campanulate; the lobes spreading, triangular, sub-acute. *Corolla* tubular, its lobes oblong, blunt, sub-erect. *Fruit* globular, crowned by the calyx-lobes, about ·1 in. in diam. Miq. Fl. Ind. Bat. II, 183; Hook fil. Fl. Br. Ind. III, 59. *Spermacoce glabra*, Roxb. Fl. Ind. I, 368. *Knovia glabra*, DC. Prod. IV, 569.

PENANG: *Schomburgh, King, Deschamps, Ridley* 5749; *King's Collector* 1870. MALACCA: *Maingay* (K.D.) 892; *Griffith* (K.D.) 2885.—DISTRIB. British India.

6. *HEDYOTIS STIPULATA*, R. Br. in Wall. Cat. 6195 and 863a. *Stems* herbaceous decumbent, rooting, less than a foot high, branching; branches (when dry) slightly compressed, deeply 2-grooved, slightly 4-angled, puberulous. *Leaves* membranous, ovate to narrowly elliptic-oblong, the apex sub-acute, the base much narrowed to the short winged petiole; both surfaces olivaceous brown when dry; the upper glabrous; the lower paler, sparsely pubescent on the 3 or 4 pairs of spreading slightly curved little prominent main-nerves; length ·75 to 1·75 in.; breadth ·4 to ·8 in.; petioles ·2 to ·3 in. *Stipules* cupular, short, the mouth wavy and bearing a few short bristles. *Peduncles* axillary and terminal, from half as long to as long as the leaves, each bearing a dense 3- to 6-flowered head about ·35 in. in diam. (when dry). *Flowers* ·15 in. long, sub-sessile. *Calyx* compressed, obovoid, glabrous, the lobes deep lanceolate, acuminate, spreading. *Corolla* short tubular, with oblong blunt broad lobes. *Anthers* oblong, large, sessile. *Capsules* longer than the flowers, broadly obovoid, almost reniform, compressed, glabrous, crowned by the enlarged triangular acuminate recurved calyx-lobes, dehiscent by apical valves; seeds numerous, brown. Hook. fil. Fl. Br. Ind. III, 63. *H. Lindleyana*, Hook. MSS. in W. & A. Prod. 409. *Oldenlandia japonica*, Miq. in Ann. Mus. Lugd. Bot. II, 194. *O. hirsuta*,

Linn. fil. Suppl. 127; DC. Prod. IV. 127. ?*Anotis capitata*, Korth in Ned. Kruidk. Nat. Gesch. II. 151.

PERAK: at 2000 feet, Wray 1450. PAHANG: Ridley 2233.—
DISTRIB. Java; British India.

7. *HEDYOTIS PEDUNCULARIS*, King n. sp. A low glabrous under-shrub; young branches slender, angled, slightly winged, shining, pale brown. *Leaves* coriaceous, linear-lanceolate, tapering acutely to each end, nerveless, the midrib strong; length 1·5 to 2·5 in.; breadth ·2 to ·35 in.; petiole ·15 to ·4 in., winged. *Stipules* with broad triangular bases, much acuminate, sparsely glandular hairy. *Peduncle* solitary, terminal, 2 to 4 in. long, bearing usually a single terminal dense, many-flowered capitulum ·75 in. in diam., sometimes with smaller capitules in the upper leaf axils; the terminal capitule with two deflexed leaf-like linear bracts. *Flowers* sessile or nearly so. *Calyx* ·15 in. long, coriaceous; its 4 lobes lanceolate, spreading, persistent in fruit. *Fruit* obovoid, ·1 in. long, the two cocci with tough integuments.

KEDAH: Ridley 5546.

8. *HEDYOTIS MAINGAYI*, Hook. fil. Fl. Br. Ind. III. 49. A low branching glabrous shrub; young branches slender, angled, slightly winged, greenish when dry. *Leaves* coriaceous, lanceolate, acute, the base rounded or slightly narrowed, nerves obsolete, the midrib bold; length 1·5 to 1·75 in.; breadth ·4 to ·6 in.; petiole ·05 to ·1 in. *Stipules* broadly triangular, acute, not acuminate, thick, persistent. *Cymes* terminal and axillary, on slender peduncles varying from ·25 to 1 in. in length; the terminal ones the longest; bracteoles thick, lanceolate; branches of inflorescence and flower-pedicels slightly winged. *Flowers* ·3 in. long, their pedicels under ·1 in. *Calyx* campanulate, deeply divided into 4 linear-lanceolate, acuminate, spreading lobes. *Corolla* salver-shaped; the limb extending beyond the calyx, divided into 4 oblong, blunt lobes. *Capsules* ovoid-globular, less than ·1 in. long, ridged, crowned by the deflexed calyx-lobes.

MALACCA: Griffith; Lobb, Cuming 2348; Maingay (K.D.) 887; Ridley 3211; Derry 619; Hullett 796. JOHOR: Ridley.

9. *HEDYOTIS CONGESTA*, R. Br. in Wall. Cat. 844. Shrubby glabrous, much-branched; branches thinner than a goose-quill, acute, angled. *Leaves* thinly coriaceous, lanceolate ovate-lanceolate or elliptic, shortly acuminate, the base rounded or slightly cuneate, both surfaces pale brown tinged with yellow or green when dry: main-nerve pairs, curved, spreading, indistinct on both surfaces when dry; length 2·5 to 5 in.; breadth 1·5 (rarely ·75) to 2 in.; petioles 15 to 35 in. *Stipules* triangular, much acuminate, nearly as long as the petioles, with many linear lobes, the middle one pectinate. *Cymes* sessile, axillary,

dense, many-flowered. *Flowers* under .15 in. long, surrounded by numerous scarious broad acute bracteoles. *Calyx* campanulate, .15 in. long, the mouth wide and divided into 4 large triangular sub-acute ciliate lobes. *Corolla* tubular, connected by the calyx-lobes, glabrous, the mouth with 4 lanceolate sub-acute much reflexed lobes. *Fruit* oblong, crowned by the large incurved calyx-lobes, glabrous, .15 in. long; *seeds* numerous. G. Don Gen. Syst. III. 525; Hook. fil. Fl. Br. Ind. III. 61. *H. argentea*, Wall. Cat. 858.

In all the provinces, common.—DISTRIB. Borneo; Sumatra.

VAR. *nicobarica*. Leaves narrowly elliptic, 3.5 to 5.5 in. long and .8 to 1.4 in. broad, much tapered at either end; the petioles .3 or .4 in. long; cymes half as long as the petioles, with fewer flowers than in the type. ? *H. carnos*a, Korth. in Ned. Kruidk. II. 161.

NICOBAR ISLANDS: *King's Collector* 506.

10. *HEDYOTIS MACROPHYLLA*, Wall. in W. & A. Prodr. 408 (excl. syn.) A low shrub; stem short, as thick as a swan-quill; branches thinner than a goose-quill, pale when dry, acutely 4-angled and sometimes winged, glabrous. *Leaves* membranous, shortly petioled, ovate or ovate-lanceolate, shortly acuminate or acute, the base broad, narrowed, or rounded; upper surface olivaceous when dry, glabrous, sometimes scaberrulous; the lower pale brown, glabrous, sometimes puberulous on the midrib and nerves; main-nerves 6 or 7 pairs, curved, ascending, rather distinct; length 3 to 6 in.; breadth 1.5 to 3 in.; petiole .3 to .7 in. *Stipules* cupular, hairy, truncate, with 8 to 10 stout erect pubescent bristles. *Cymes* axillary, sessile, globular, many-flowered, densely crowded, .5 in. across. *Flowers* .1 in. long, sessile or shortly pedicelled, mixed with linear hairy bracteoles some of them longer than themselves. *Calyx* compressed, narrowly funnel-shaped, pubescent, the 4 lanceolate lobes as long as the tube. *Corolla* pubescent, shorter than the calyx-lobes; its lobes 4, broad, blunt. *Capsule* many-seeded, ovoid, hairy, not longer than the persistent calyx-lobes. Wall. Cat. 841; Hook. fil. Fl. Br. Ind. III. 54 (excl. syn.) *H. nodiflora*, Wall.

v. MALACCA: *Griffith* (K.D.) 2889 in part. PENANG: *Wallich*.

¹⁵The description given above is founded on the Penang plant on which Wight and Arnott based the species. In the Kew Herbarium the species issued by Wallich as *H. n. nodiflora* (Cat. 855) has been put with this, the latter seems, however, to be a totally different species with much narrower leaves and smaller heads with fewer flowers.

11. ¹⁴*HEDYOTIS KUNSTLERI*, King n. sp. Herbaceous, erect, 12 to 18 in. high; stems glabrous, thinner than a goose-quill, acutely 4-angled. *Leaves* membranous, oblong-elliptic, tapering to each end but more gradually to the apex than to the base, both surfaces glabrous,

olivaceous, the lower paler, the upper slightly scaberulous; main-nerves 5 or 6 pairs, ascending obliquely, almost straight, slightly prominent on the lower surface; length 3·5 to 4·5 in.; breadth 1·5 to 2 in.; petiole ·5 or ·6 in. *Stipules* shallow cupular, with numerous erect long subulate pubescent teeth ·3 in. in length. *Cymes* axillary sessile, glomerulate, many-flowered, dense, shorter than the petioles, hispidulous-puberulous in all parts. *Flowers* ·15 in. long, on short bracteolate pedicels. *Calyx* with narrow tube and 4 long lanceolate spreading lobes. *Corolla* shorter than the calyx, tubular, with 4 spreading oblong short lobes. *Anthers* 4, oblong, sessile, brown. *Fruit* ovoid, slightly 2-grooved, crowned by the calyx-lobes, less than ·1 in. long, separating into two cartilaginous many-seeded cocci. *Seeds* numerous, angular, brown.

PERAK: *King's Collector* 8728.

A species allied to *H. macrophylla*, Wall., but herbaceous and with narrower leaves, the main-nerves not curved, much narrowed to the base; slightly longer flowers (·15 in. as against ·1 in.) Closely allied also to the Ceylon *H. Thwaitesii*, Hook. fil., but with more acutely angled stems, shorter petioles and smaller less numerous flowers. The calyx-teeth of this are also smaller and narrower and the capsules have numerous seeds.

12. *HEDYOTIS CONNATA*, Wall. Cat. 856. Herbaceous, glabrous, diffuse, the stems as thick as a crow-quill, terete, wiry, smooth, decumbent near the base and rooting at the nodes, the younger somewhat compressed, grooved and 4-angled when dry. *Leaves* membranous, narrowly oblong to elliptic-oblong, acute or shortly acuminate rather abruptly narrowed at the base to the short petiole; upper surface olivaceous, glabrous; the lower pale, glabrous except the rather bold puberulous midrib; main-nerves 4 or 5 pairs, rather straight, oblique, invisible on the upper surface and faint on the lower; length 1·75 to 2·75; breadth ·35 to ·75 in.; petiole about ·1 in., puberulous. *Stipules* campanulate, the mouth rounded, bearing about 10 spreading erect, filiform scabrid bristles often ·45 in. long. Hook. fil. Fl. Br. Ind. III. 62. *H. merguensis*, Hook. fil. in Gen. Plant. II. 57.

PERAK: *Scortechini*. LANKAWI: *Curtis*.—DISTRIB. Burma.

13. *HEDYOTIS AURICULARIA*, Linn. Sp. Pl. 101. Herbaceous, diffuse or erect; young branches thicker than a crow-quill, slightly compressed and 4-angled when dry, shortly and softly pubescent. *Leaves* lanceolate or narrowly elliptic-lanceolate, acute or shortly acuminate, the base rather abruptly cuneate; both surfaces olivaceous when dry, the upper sparsely scaberulous-pubescent, the lower paler and more pubescent; both surfaces sometimes glabrous and more or less smooth; main-nerves 4 to 6 pairs, rather straight, obliquely ascending, depressed above and prominent beneath; length 1·5 to 2·25 in.; breadth ·35 to ·85 in.;

petioles .2 to .35 in., pubescent. *Stipules* adnate to the petioles to form a campanulate cup with acuminate 2- or 3-bristled mouth. *Cymes* almost sessile, many-flowered, condensed. *Flowers* nearly sessile, less than .1 in. long. *Calyx* hairy, campanulate, with 4 spreading ovate or lanceolate acute lobes. *Corolla* longer than the calyx, salver-shaped, the lobes narrow. *Fruit* globular-turbinate, crowned by the spreading calyx-lobes, shortly hairy. *Seeds* numerous, dark brown. *Prod.* IV. 420; *Roxb. Fl. Ind.* I. 365; *ed. Carey & Wall.* I. 369; *W. & A. Prod. Fl. Penins. Ind.* 412; *Hook. fil. Fl. Br. Ind.* III. 58. *H. nervosa*, *Wall. Cat.* 857 (P not of *Lam.*) *H. procumbens*, *Wall. Cat.* 861. *H. lineata*, *Wall. Cat.* 6198 (not of *Roxb.*) *H. costata*, *R. Br. in Wall. Cat.* 849; *G. Don. Gen. Syst.* III. 526. *H. multicaulis*, *Schldl. Pl. Hohen.* No. 845. *H. venosa*, *Korth. in Ned. Kruidk. Arch.* II. 160. *Metabolus venosus*, *Bl.; DC. Prod.* IV. 435. *Spermacoce hispida*, *Miq. Pl. Hohen.* No. 44. *Rheede Hort. Malab.* X. t. 32.

PERAK: *Scortechini* 110, 113; *Wray* 3078, 3085; *King's Collector* 88. PAHANG: *Ridley* 1185, 2674. SINGAPORE: *Ridley* 2863. KEDAH: *Ridley* 5547. MALACCA: *Maingay* (K.D.) 891.—DISTRIB. British India; tropical Australia.

14. *HEDYOTIS HAVILANDI*, n. sp. *King*. Herbaceous, often rooting at the lower nodes, woody at the base, green when dry; stems thicker than a crow-quill, acutely 4-angled and broadly grooved, deciduously scurfy-hairy especially near the nodes, but afterwards glabrous. *Leaves* membranous, elliptic, tapering to each end, acute, the edges finely undulate when dry; both surfaces, but especially the upper, minutely hispid; main-nerves 3 or 4 pairs, curving upwards, faint on both surfaces (when dry), the midrib pale and prominent on the lower; length 1 to 1.5 in.; breadth .5 to .7 in.; petiole .3 to .5 in. *Stipules* triangular, rather shorter than the cymes, much acuminate and with several long lateral teeth, pilose externally. *Cymes* axillary, sessile, crowded, many-flowered, about .25 in. in diam. *Flowers* .1 in. long, on short hairy pedicels with a few bracteoles between them. *Calyx* pubescent, campanulate; the tube narrow, its mouth with linear-lanceolate acuminate spreading teeth as long as the tube. *Corolla* not much exceeding the calyx-lobes, tubular with 4 broad oblong lobes. *Anthers* oblong, on rather long filaments. *Capsule* narrowly ovoid, crowned by the spreading calyx-lobes, thin-walled, sparsely hispid or glabrous, dehiscent, with several brown seeds in each cell.

PERAK: *Scortechini*; *King's Collector* 10254; *Wray* 4062. PENANG: *Curtis*.—DISTRIB. Burma; Borneo, *Haviland* and *Hose*, 3450 C.

15. *HEDYOTIS TENELLIFLORA*, *Blume Bijdr.* 971. Herbaceous, erect, glabrous, a foot or more in height, little-branched. *Stems* and *branches*

about as thick as a crow-quill, when dry dark-coloured, the older subterete, the younger deeply 2-grooved and slightly 4-angled. *Leaves* often in whorls of 4 or 6, coriaceous, sessile, linear, sub-acute, the bases passing into the stipules. *Stipules* cupular, short, the mouth truncate, with about 6 erect flat stout bristles; length 1 to 1.5 in.; breadth .1 to .15 in. *Cymes* very short (under .2 in. long), axillary, crowded. *Flowers* .15 in. long, sessile, surrounded by numerous bracteoles bearing long erect bristles. *Calyx* compressed, obovoid-campanulate, pilose towards the apex; the mouth with 4 lanceolate, acute, spreading, deciduous lobes. *Corolla* slightly exceeding the calyx-lobes, sub-tubular; lobes of the mouth short with thickened apices. *Anthers* broadly ovoid, sessile. DC. Prod. IV. 419; Hook. fil. Fl. Br. Ind. III. 60. *H. angustifolia*, Cham. & Schlect. in Linnæa IV. 153. *H. approximata*, Wall. Cat. 852. ? *Spermacoce tubularis*, Br. in Wall. Cat. 836. *Scleromitron tenelliflorum*, Korth. in Ned. Kruidk. Arch. II, 155. *S. tetraquetrum*, Miq. Fl. Ind. Bot. II. 186. *Oldenlandia angustifolia*, Benth. Fl. Hongk. 151. ◆

PENANG: Ridley 7097. PROVINCE WELLESLEY: Curtis 2236. MALACCA: Hervey.

16. HEDYOTIS NITIDA, W. & A. Prod. Fl. Penins. Ind. 412. Diffuse, sometimes with woody roots; stems about as thick as a crow-quill, 2-grooved, sharply 4-angled, the angles often minutely hispid. *Leaves* coriaceous, sessile, narrowly lanceolate or linear, the edges much recurved, nerves none, but the midrib prominent beneath; the upper surface olivaceous when dry, shining and minutely pitted, quite glabrous; the lower dull pale brown; length .6 to 1 in.; breadth .1 to .25 in. *Stipules* continuous with the bases of the leaves, deeply campanulate, pubescent outside, the mouth bearing 6 to 8 long erect shining bristles. *Inflorescence* axillary, sub-sessile, 2- to 4-flowered. *Flowers* .2 in. long, minutely bracteolate, sessile or on very short pedicels. *Calyx* tubular-campanulate, shortly hispid; the mouth with 4 deep, ovate-acute, ciliate, sub-erect lobes. *Corolla* included in the calyx, pubescent, tubular, its mouth with 4 narrowly ovate sub-acute erect lobes. *Anthers* oblong, sessile. *Capsule* ovoid, crowned by the long erect stiff calyx-lobes, dehiscing by apical valves, sub-glabrous; seeds numerous, brown. Hook. fil. Fl. Br. Ind. III. 61. *H. Neesiana*, Arn. Pugill. 23. *H. glabella*, Br. in. Wall. Cat. 886, Bedd. Ic. Pl. t. 36.

PERAK: Scortechini; Wray 3680. PENANG: King.—DISTRIB. British India; Ceylon.

This species, which closely resembles *H. hispida*, Retz., and *H. tenelliflora*, Bl., has not hitherto been recorded from the Malay Peninsula or Islands. The specimens from Penang and Perak have smaller leaves than the majority of those from British India and Ceylon, but otherwise they agree.

17. *HEDYOTIS PINIFOLIA*, Wall. Cat. 850; Hook. fil. Fl. Br. Ind. III. 60. Diffuse, sometimes with a woody root; stems as thick as a crow-quill or thicker, terete when old, angled and grooved when dry, glabrous. *Leaves* sessile, sub-coriaceous, linear, acute, the margins revolute, the bases adnate to the short truncate stipules, puberulous on the upper but glabrous on the lower surface, nerves obscure, midrib distinct; length .5 to 1.5 in.; breadth .05 to .1 in. *Stipules* cupular, glabrous, with a few small bristles on the mouth. *Cymes* axillary and terminal, sessile, 1- to 4-flowered. *Flowers* .1 in. long, on pedicels shorter than themselves. *Calyx* sparsely hispid, ovoid-campanulate, with 4 narrow spreading acute lobes nearly as long as the tube. *Corolla* with a cylindrical tube exceeding the calyx-lobes; its lobes 4, lanceolate, acute. *Stamens* exserted. *Capsule* sparsely pubescent, membranous, broadly ovoid, ridged, crowned by the calyx-teeth, dehiscing by apical valves, several seeded. G. Don Gen. Syst. III. 525; *Scleromitron rigidum*, Kurz in Journ. As. Soc. Beng. 1877 II. 136 (excl. syn. Miq.)

PERAK: *Ridley* 3070, 7203; *Scortechini* 1012. PROVINCE WELLESLEY: *King*. SINGAPORE: *Ridley* 8924, 8925; *Hullett* 564. JOHOR: *Ridley* 11141. PAHANG: *Ridley* 1623. KEDAH: *Curtis*. MALACCA: *Griffith* (K.D.) 2895/2.—DISTRIB. British India.

18. *HEDYOTIS HISPIDA*, Retz Obs. IV. 23. Herbaceous, slightly branched; stems thicker than a crow-quill, sub-terete when old, deeply two-grooved, compressed and 4-angled when young, sparsely and softly pubescent, especially near the nodes. *Leaves* thinly coriaceous, narrowly oblong-lanceolate, acute, the base somewhat narrowed; both surfaces slightly scaberulous, olivaceous-green when dry, and the edges recurved; main-nerves obscure, midrib prominent below; length .8 to 2 in.; breadth .25 to .5 in.; petiole .1 in. or less. *Stipules* adnate to the petiole to form a campanulate pubescent cup with 6 to 8 bristles on its mouth. *Cymes* few-flowered, sessile, axillary. *Flowers* .2 in. long, sessile. *Calyx* campanulate, hispid, its lobes linear, erect, as long as the tube. *Corolla* as long as the calyx-lobes, tubular; its lobes lanceolate, acuminate, hairy. *Capsule* .1 in. long, ovoid, coarsely pubescent, ribbed, crowned by the erect linear calyx-teeth. *Seeds* numerous, dark brown. Roxb. Fl. Ind. I. 364; Wall. Cat. 845; Hook. fil. Fl. Br. Ind. III. 61. *Scleromitron hispidum*, Korth. in Miq. Fl. Ind. Bot. II. 185. *Oldenlandia hispida*, Benth. Fl. Hongk. 150.

PERAK: *Scortechini* 47, 201. PENANG: *Deschamps*; *Curtis* 1847.—DISTRIB. British India.

13. OLDENLANDIA, Linn.

Slender erect or diffuse much-branched herbs. *Leaves* usually

small, stipules acute or bristly. *Flowers* small, often white, in axillary or terminal dichotomous often paniculate cymes, sometimes solitary. *Calyx* obovoid or turbinate; the mouth 4- rarely 5-toothed; the teeth in fruit erect, often distant and sometimes with interposed processes. *Corolla* funnel- or salver-shaped, with a long or short tube, or rotate: its lobes 4, rarely 5, obtuse, valvate. *Ovary* 2-celled; ovules numerous, the placentas attached to the septum; style filiform; stigmas 2, oblong. *Capsule* small, crowned by the calyx-teeth, usually membranous, sub-globular, often compressed, didymous or ridged, loculicidal at the apex, many-seeded, rarely indehiscent. *Seeds* globose or angled, not winged, smooth or pitted; embryo clavate, in fleshy albumen.—*DISTRIB.* Species about 80; tropical and sub-tropical, mostly Asiatic.

Leaves in one or more whorls near the base of the stem,
elliptic, blunt ... 1. *O. nudicaulis*.

Leaves scattered along the whole length of the stem:—

Flowers in terminal or axillary few-flowered cymes not
much longer than the elliptic-oblong sub-acute leaves:
ripe capsules about .15 in. in diam. ... 2. *O. paniculata*.

Flowers in terminal or axillary dichotomous lax cymes,
the branches and flower-pedicels long and filiform; leaves
narrowly oblong-lanceolate, much narrowed to the base
and apex: ripe capsules less than .1 in. in diam. ... 3. *O. dichotoma*.

Flowers 2 to 4 on a slender axillary pedicels or solitary on
long pedicels; capsule more than .1 in. broad; leaves
linear ... 4. *O. corymbosa*.

Flowers solitary in the leaf-axils:—

Some of the flowers solitary, always on long slender
pedicels; leaves linear ... 4. *O. corymbosa*.

All the flowers solitary and on long slender pedicels,
leaves linear ... 5. *O. Heynei*.

All the flowers sessile:—

Leaves narrow, many times longer than broad ... 6. *O. diffusa*.

Leaves rotund-ovate to elliptic not much longer than
broad ... 7. *O. trinervia*.

1. *OLDENLANDIA NUDICAULIS*, Roth Nov. Sp. 95. A small erect glabrous annual, 4 to 6 inches high, drying green; stem very slender, an inch or two long, minutely scurfy-puberulous, bearing several whorls of 3 or 4 thin, sparsely and minutely scaly, elliptic, rather blunt leaves abruptly narrowed at the base and inserted on the stipules by very short broad petioles, and with about 4 pairs of faint ascending main nerves, from .7 to 1.5 in. long and from .35 to .65 in. broad. *Cymes* slender, laxly corymbose, simple or branched, minutely bractedly solitary or several together from the apex of the stem, 1.5 to 3.5 in. *O.* (half of the length being peduncle). *Flowers* .15 in. long, 400. fl.

pedicels .2 to .5 in. long. *Oalyx* cylindric or campanulate with small lanceolate acute spreading teeth. *Corolla* much exceeding the calyx, deeply cut into 4 oblong, blunt, nerved lobes. *Stamens* slightly shorter than the corolla; *anthers* linear, as long as the slender filament. *Capsule* turbinate, the top broad, the persistent calyx-teeth small. *Seeds* numerous. Hook. fil. Fl. Br. Ind. III. 70. *O. rotundifolia*, G. Don Syst. III. 530. *O. ovalifolia* and *O. spergulacea*, DC. Prod. IV. 427, 428. *Hedyotis scapigera*, R. Br. in Wall. Cat. 881. *H. nudicaulis*, W. & A. Prod. 416; Bedd. Ic. Pl. Ind. Or. t. 34. *H. ovalifolia* Cav. Ic. 573. *H. rotundifolia*, Ham. in Wall. Cat. 6190 (not of DC.) *H. spergulacea*, Kurz in Journal As. Soc. Beng. 1877, II. 134.

MALACCA: Griffith (K.D.) 2898. KEDAH: Curtis 2669.—DISTRIB. British India; Java; Philippines.

2. OLDENLANDIA PANICULATA, Linn. Sp. Pl. 1667. Herbaceous, annual, glabrous, drying a pale olivaceous colour, erect or diffuse, much branched; young branches acutely 4-angled, sometimes narrowly winged, about as thick as a crow-quill. *Leaves* membranous, elliptic or elliptic-oblong, sub-acute, narrowed gradually at the base to the short petiole, both surfaces dull when dry, the nerves indistinct; linear with the midrib distinct; length .4 to .75 in.; breadth .2 to .3 in.; petiole .1 to .2 in. *Stipules* short, cupular, truncate, without bristles or with only 1 or 2 in the middle. *Oymes* in the upper axils or terminal, on peduncles as long as or not more than twice as long as the leaves, lax, few-flowered, minutely bracteolate. *Flowers* under .1 in. long, on thin pedicels two or three times longer than themselves. *Calyx* campanulate, with 4 rather distinct narrow teeth. *Corolla* not much exceeding the calyx-teeth. *Capsule* slightly compressed, turbinate, more than .1 in. diam.; crowned by the small spreading calyx-teeth; seeds numerous, black. Burm. Fl. Ind. 38, t. 15, f. 1; DC. Prod. IV. 427; Hook. fil. Fl. Br. Ind. III. 69. *O. alata*, Roxb. Fl. Ind. I. 421 (not of Koenig). *Hedyotis racemosa*, W. & A. Prod. 414; Wight Ic. t. 312; Wall. Cat. 875 (in part). *H. paniculata*, Lam. Encyc. III. 79; Kurz in Journ. As. Soc. Beng. 1877 II. 134. *H. minima*, Heyne, Wall. Cat. 877.

MALACCA: Griffith (K.D.) 2902. PERAK: Scortechini 1107.—DISTRIB. British India; Malay and Philippine Islands; China; Polynesia.

3. OLDENLANDIA DICHOTOMA, Hook. fil. Fl. Br. Ind. III. 67. Annual, herbaceous, erect, branching; stems glabrous or very sparsely and minutely hispidulous, as thick as a crow-quill, obscurely 4-angled, pale when dry. *Leaves* membranous, narrowly oblong-lanceolate, tapering to both ends; upper surface olivaceous, somewhat scaberulous, and minutely hispidulous; the lower pale, glabrous, nerves slender, midrib broad and distinct on the lower surface; length .75 to

1·25 in.; breadth ·1 to ·2 in.; petiole ·05 in. to 0. *Stipules* cupular, very short, with small obscure teeth not bristly. *Cymes* axillary and terminal, with many long slender dichotomous few-flowered, angular, sub-hispidulous branches; the lateral cymes 1 to 2 in. long, the terminal one 3 to 5 in., with leaf-like linear bracts varying from ·25 to ·5 in. in length. *Flowers* ·2 in. long, clavate in bud, solitary at the ends of the ultimate hair-like branchlets. *Calyx* campanulate; the lobes 4, lanceolate, sub-erect, sub-glabrous, often with smaller lobes interposed. *Corolla* twice as long as the calyx, funnel-shaped, the tube long and narrow; the limb wide, with 4 spreading lanceolate teeth, glabrous. *Capsules* less than ·1 in. in diam., sub-globular, crowned by the small distant erect calyx-teeth, glabrous, dehiscent. *Seeds* numerous, brown. *Hedyotis dichotoma*, Koen. ex Roth Nov. Sp. 93; Wall. Cat. 6204 (*in part*); W. & A. Prod. 416 (*excl. some synonyms*). *H. affinis*, Roem. & Sch. Syst. 194. *H. Heynei*, Bedd. Ic. Pl. In. Or. t. 33 (not of Brown). *H. brachiata*, Wall. Cat. 6201 (*in part*) not of Wight.

PENANG: *King's Collector* 1282; *Curtis* 494; *Deschamps*. PROVINCE WELLESLEY: *King*. MALACCA: *Ridley* 1717. JOHOR: *Ridley* 11146.

4. OLDENLANDIA CORYMBOSA, Linn. Sp. Pl. 119. Rather stouter and more branched than *O. dichotoma*, and the branches more boldly angled. *Leaves* usually rather shorter, many of them not exceeding ·5 in. in length. *Flowers* solitary, on pedicels not more than half as long as in *O. dichotoma*, or in pedunculate 3- to 4-flowered corymbs, otherwise as in *O. dichotoma*. Hiern Flora Trop. Afric. III. 62; Hook. fil. Fl. Br. Ind. III. 64; Trim. Fl. Cey. I. 314. *O. biflora*, Lam. Encyc. IV. 533 (*not of Linn.*); Roxb. Fl. Ind. I. 423. *O. ramosa*, Roxb. l. c. 424. *O. herbacea*, DC. Prod. IV. 425 (*not of Linn.*) *O. scabrida*, DC. l. c. *Hedyotis Burmaniana*, Br. in Wall. Cat. 868 *in part*; W. & A. Prod. Fl. Pen. Ind. 415. *H. biflora*, Roth Nov. Spec. 92; Kurz in Journ. As. Soc. Beng. 1877, II. 133. *H. ramosa*, Bl. Bijdr. 973; ? Wight Ic. t. 822. *H. intermedia*, W. & A. Prod. 415. *H. alsinæfolia*, Br. in Wall. Cat. 873. *H. graminicola*, Kurz in Timen's Journ. Bot. 1875, 326. *Gerontogea biflora*, Cham. & Schl. in Linnæa. IV. 155.—Rheede Hort. Mal. x. t. 38.

JOHOR: *Ridley* 2861, 11142. SINGAPORE: *King's Collector* 27; *Ridley*. PENANG: *Curtis* 494, 1849, 1988. PROVINCE WELLESLEY: *King*. ANDAMANS: *King's Collector*.—DISTRIB. British India; Malay Archipelago; tropical Africa and America.

5. OLDENLANDIA HEYNEI, G. Don Gen. Syst. III. 531. Stouter and taller than *O. dichotoma* and drying (especially as regards the under surfaces of the leaves) of a darker colour, and the stems more boldly 4-angular; the flowers solitary but on equally long pedicels as in *O. dichotoma*, the capsules slightly larger and wider at the base. Hook. fil.

Fl. Br. Ind. III. 65. *O. herbacea*, Roxb. Fl. Ind. I. 424. *O. linearis*, *O. linifolia* and *O. asperula*, DC. Prod. IV. 425. *Hedyotis Heynii*, W. & A. Prod. 416; Wall. Cat. 867 (*in part*).

PENANG: Curtis 1848, 3399; King; Deschamps. PROVINCE WELLESLEY: King. PERAK: Ridley 10813; Wray 1931. SINGAPORE: Ridley 10916.—DISTRIB. Malay Archipelago; Tropical Africa.

This passes into *O. dichotoma* as regards its inflorescence there being some specimens in which, by reason of the smallness of the leaves, the inflorescence resembles a lax panicle.

6. *OLDENLANDIA DIFFUSA*, Roxb. Hort. Beng. 11; Fl. Ind. I. 423. Annual, diffuse, much-branched, dark brown when dry; glabrous. *Stems* about as thick as a crow-quill when dry, compressed, obscurely 4-angled, striate. *Leaves* linear-oblong, tapering to each end, the bases continuous with the stipules, the edges recurved, rather pale on the undersurface and the midrib prominent; length .5 to 1.5 in.; breadth .05 to .1 in. *Stipules* cupular, the edges with a few short bristles towards the middle. *Flowers* .15 in. long, solitary, axillary, sub-sessile or on peduncles .05 to .1 in. long, reflexed. *Calyx* widely campanulate, with 4 erect triangular acute 1-nerved teeth. *Corolla* longer than the calyx, widely campanulate, the mouth with 4 erect rather short broad triangular teeth. *Anthers* shorter than the style, small, narrowly ovoid; filaments rather short. *Stigma* with 2 divergent lobes. *Capsule* depressed globular, crowned by the small calyx-teeth, slightly more than .1 in. in diam., many-seeded. DC. Prod. IV. 426; Hook. fil. Fl. Br. Ind. III. 64; Trim. Fl. Ceyl. II. 315. *O. brachypoda*, DC. l.c. 424; Wall. Cat. 874. *Hedyotis ramosissima*, Kurz in Journ. As. Soc. 1877 II. 133. *H. diffusa*, Willd. Sp. Pl. I. 566; Wall. Cat. 868 (*in part*). *H. extensa*, Wall. Cat. 869. *H. polygonoides*, Wall. Cat. 872.

In all the provinces except the Andamans; common.—DISTRIB. Tropical Asia; Japan.

7. *OLDENLANDIA TRINERVIA*, Retz Obs. IV. 23. Annual, herbaceous, glabrous or hairy, procumbent, greenish brown when dry. *Stems* very slender, grooved, 4-angled, sparsely hairy, often rooting at the nodes. *Leaves* ovate-rotund to rotund or elliptic, thickly membranous, midrib distinct below but the 1 or 2 pairs of nerves obscure, both surfaces glabrous or sub-glabrous; length .2 to .3 in.; breadth under .05 or over; petiole usually under .05 in. long. *Stipules* scarious, campanulate with a few bristles. *Flowers* .05 in. long, solitary, axillary, on short reflexed pedicels. *Calyx* campanulate, with 4 acute spreading teeth, sparsely pilose. *Corolla* slightly exceeding the calyx, with 4 broad, ovate, sub-acute lobes, glabrous. *Capsules* somewhat compressed, broadly ovate, truncate at the apex, crowned by the small calyx-lobes, dehiscing at

the apex; *seeds* numerous, angled, black. Hook. fl. Fl. Br. Ind. III. 66; Trim. Flora Ceylon III. 316. *O. repens*, Burm. Fl. Ind. t. 15, f. 2? *Hedyotis trinervia*, W. & A. Prod. 414; Dalz. & Gibs. Fl. Bomb. 115. Bedd. Ic. Pl. Ind. Or. t. 29. *H. rotundifolia*, DC. Prod. IV. 420. *H. serpyllifolia*, Poir. in DC. l.c. 421. *H. orbiculata*, Heyne, Wall. Cat. 6191.

SINGAPORE: Ridley 8047. PAHANG: Ridley 1492. PENANG: Curtis 1844.—DISTRIB. British India; Sumatra; Java; Borneo; Philippines; Ceylon; Tropical Africa.

14. OPHIORRHIZA, Linn.

Decumbent creeping or erect herbs (rarely under-shrubs), with slender terete branches. *Leaves* usually elliptic-lanceolate, often unequal; *stipules* caducous, very often small. *Flowers* rather small, white, pink or greenish, secund in dichotomously branched axillary or terminal cymes; bracts and bracteoles various or absent. *Calyx* short, usually cylindric or campanulate, becoming obreniform or obcordate in fruit, the lobes small and persistent. *Corolla* tubular or funnel-shaped, the tube inside glabrous or hairy; the lobes 5, short, valvate in bud, often winged on the back, and with a fold in the sinus between neighbouring lobes. *Stamens* 5, inserted on the tube; *anthers* linear. *Disk* large, fleshy, 2-lobed. *Ovary* 2-celled; style filiform; stigmas 2, linear or broad; *ovules* numerous, inserted on placentas ascending from the bases of the cells. *Capsules* coriaceous, compressed obreniform or obcordate, dehiscing at the apex by 2 broad gaping valves; placentas divaricating, many-seeded. *Seeds* minute, angled, the testa crustaceous; embryo clavate, in fleshy albumen.—DISTRIB. Species about 50, tropical Asiatic.

Leaves quite glabrous:—

- | | | | | |
|---|-----|-----|-----|--------------------------|
| Stipules lanceolate; leaves elliptic or elliptic-oblong, 1 to 1.5 in. broad | ... | ... | ... | 1. <i>O. discolor.</i> |
| Stipules reduced to rugulose bands; leaves elliptic, 1.5 to 4 in. broad | ... | ... | ... | 2. <i>O. erubescens.</i> |

Leaves glabrous except their nerves:—

- | | | | |
|--|-----|-----|---------------------------|
| Larger leaves 5 or 6 in. long and 1.5 to 2 in. broad, midrib nerves and reticulations puberulous | ... | ... | 3. <i>O. fasciculata.</i> |
| Larger leaves 2 to 3 in. long and .65 to 1 in. broad; nerves and midrib beneath with dense pale pubescence | ... | ... | 4. <i>O. hispidula.</i> |

- | | | | | |
|--|-----|-----|-----|----------------------|
| Leaves glabrous on the upper surface, glabrous or puberulous and usually stained with red on the lower when dry, elliptic or oblong-elliptic, 2 to 5 in. long and 1 or 2 in. broad | ... | ... | ... | 5. <i>O. Mungos.</i> |
|--|-----|-----|-----|----------------------|

Leaves slightly puberulous:—

- | |
|---|
| Stipules forming a broadly triangular very shallow cup, |
|---|

the mouth sub-truncate; leaves puberulous above on and near the edges and on midrib; '5 to '75 in. broad ... 6. *O. Harrisiana*
var. *argentea*.

Stipules forming a short cup with its mouth obscurely toothed; leaves minutely puberulous on midrib and nerves beneath, '5 to 1 in. broad ... 7. *O. tenella*.

Stipules lanceolate with long filiform points; larger leaves 3 or 4 in. long and '75 to 1'25 in. broad, glabrous but for a few scattered thick hairs ... 8. *O. rugosa*.

Leaves hairy everywhere on both surfaces :—

Larger leaves 2'5 to 4 in. long, both surfaces with white hispidulous hairs, narrowly elliptic, '75 to 1'25 in. broad... 9. *O. tomentosa*.

Leaves elliptic or ovate-elliptic, 3'5 to 5 in. long and 1'75 to 2'5 in. broad, sparsely strigose above, hispidulous beneath ... 10. *O. Kunstleri*.

1. *OPHIORHIZA DISCOLOR*, R. Br. in Wall. Cat. 6232 A. *Stem* erect, woody in its lower part, dark-coloured, terete, glabrous. *Leaves* of the pairs unequal, but not greatly so, membranous, narrowly elliptic or elliptic-oblong, much acuminate and narrowed from below the base to the long rather slender petiole; both surfaces quite glabrous; the upper dark brown, slightly tinged with purple; the lower pale minutely reticulate and much tinged with purple; main-nerves 7 to 12 pairs, curved, spreading, faint on the upper surface and but little prominent on the lower; length 2'5 to 4'5 in.; breadth 1 to 1'5 in.; petioles '35 to 1 in. *Stipules* linear-lanceolate, '1 to '2 in. long, deciduous. *Cymes* solitary, terminal, an inch or two in length; few-branched, ebracteolate; the peduncle and branches minutely puberulous. *Flowers* '25 in. long, secund in a single row, on very short pedicels which lengthen in fruit. *Oalyx* narrowly campanulate; the teeth short, broad, boldly 1-nerved. *Corolla* clavate in bud, '2 in. long; tube cylindric, slightly inflated in the upper half; the teeth shorter than the tube, obtuse, erect. *Capsule* narrowly obreniform, the sinus almost obsolete, glabrous, '3 in. across. G. Don Gen. Syst. Bot. III. 522; Hook. fil. Fl. Br. Ind. III. 79. *O. villosa*, Wall. Cat. 6230 (not of Roxb.)

JOHOR: Ridley. PENANG: Deschamps.

2. *OPHIORHIZA ERUBESCENS*, Wall. Cat. 6233. Glabrous except the puberulous inflorescence; stem 1 to 3 feet high, woody, as thick as a goose-quill, the bark whitish, striate, corky. *Leaves* of each pair sub-equal, thinly membranous, elliptic-lanceolate, elliptic-oblancoate or narrowly elliptic, somewhat oblique, acuminate, the base much narrowed; upper surface greenish when dry, the midrib prominent but the nerves faint; lower surface pale greenish-white, reticulate, the 10 to 14 pairs of rather straight spreading main-nerves rather flat and prominent like the midrib; length 4 to 9 in.; breadth 1'5 to 4 in.;

petioles .35 to 1.2 in.; *stipules* (dried specimens) reduced to rugulose transverse bands. *Cymes* terminal, solitary, pedunculate, in flower much shorter than, but in fruit half as long as, the leaves or even more; the branches divaricate, slender, many-flowered, in fruit often as much as 2.5 in. long. *Flowers* .35 in. long, secund, on short puberulous pedicels, very narrow in bud. *Calyx* cylindric, .05 in. long; its teeth broadly triangular, sub-acute, 1-nerved. *Corolla* .3 in. long, narrowly cylindric; the mouth with 5 short blunt reflexed teeth. *Anthers* 5, linear, cordate at the base. *Capsules* narrowly rhomboid, the upper edge marginate, glabrous, .3 in. across. Hook. fil. Fl. Br. Ind. III. 84 as a doubtful species.

PERAK: *Scortechini* 1313; *Wray* 3731, 4050; *King's Collector* 2187, 7119, 5853, 7186, 7119; *Curtis*.—DISTRIB. Burma.

3. *OPHIORHIZA FASCICULATA*, Don Prod. Fl. Nep. 136. Stem 10 to 14 in. high, erect, little-branched, woody, and nearly as thick as a goose-quill below, puberulous. *Leaves* of a pair very unequal in size, membranous, narrowly elliptic or oblong-elliptic, sub-acute, the base cuneate; upper surface very dark olivaceous when dry, glabrous, the nerves and midrib pale and prominent; lower surface pale yellowish-brown, puberulous on the midrib and 9 to 11 pairs of boldly curved spreading dark-coloured main-nerves; the reticulations also puberulous, their interspaces glabrous; length of the larger leaves 5 or 6 in.; breadth 1.5 to 2 in.; the smaller leaves of the pairs .8 to 2.5 in. long and .85 to 1.5 in. broad; petioles .2 to .8 in. long. *Stipules* .15 in. long, subulate with dilated bases. *Cymes* usually solitary, but sometimes 2 or 3 together, terminal, pedunculate, usually less than half as long as the leaves even when in fruit, puberulous everywhere, ebracteate; branches shorter than the peduncles. *Flowers* small (rather less than .25 in. long), on short puberulous pedicels. *Calyx* narrowly campanulate, densely puberulous, boldly ribbed; the teeth shorter than the tube, triangular, acute, erect. *Corolla* .2 in. long, cylindric, inflated in the lower part and expanded at the mouth; the 5 lobes short, blunt. *Anthers* narrowly linear, on short filaments. *Capsules* obreniform, the sinus shallow, glabrous, .25 in. across. Hook. fil. Fl. Br. Ind. III. 83. *O. bracteolata*, R. Br. in. Wall. Cat. 6228.

PERAK: *King's Collector* 2205; *Wray* 1989.—DISTRIB. Himalaya and Khasia.

4. *OPHIORHIZA HISPIDULA*, Wall. Cat. 6234. Erect, little-branched, slender, pubescent, thicker than a crow-quill. *Leaves* of the pair unequal, membranous, ovate-lanceolate, sub-acute, cuneate (sometimes abruptly so) at the base; upper surface (when dry) olivaceous, glabrous, the midrib prominent but the nerves rather obscure; lower surface pale olivaceous, otherwise sub-glabrous but the bold midrib and 6, or 7 pairs

of spreading main-nerves covered with minute dense white pubescence; length .75 to 2 in.; breadth .4 to 1 in.; petioles .15 to .6 in. *Stipules* narrowly linear-lanceolate from broad bases, .1 to 2 in. long. *Cymes* terminal, solitary, pedunculate, shorter than the leaves, ebracteate, everywhere shortly pubescent; branches few, shorter than the peduncles. *Flowers* .25 in. long, few but crowded, sessile or on short pedicels. *Calyx* rather under .1 in. long, cylindric, with 5 narrow erect teeth shorter than the tube, puberulous outside like the corolla. *Corolla* cylindric, somewhat inflated in the lower half; the mouth with 5 narrowly oblong sub-acute erect short lobes. *Capsules* obreniform with a shallow sinus, shortly and coarsely pubescent, .2 in. across. *O. trichocarpa*, Hook. fil. Fl. Br. Ind. III. 78 (not of Blume).

PAHANG: Ridley 2199, 2200; Yapp 536.

5. *OPHIORHIZA MUNGOS*, Linn. Sp. Pl. 150. Glabrous in all its parts, or puberulous on the stems, under surfaces of the leaves, and on the inflorescence. *Stems* from a few inches to a foot and a half high, erect, little branched, thicker than a crow-quill, woody near the base. *Leaves* membranous, one of each pair slightly larger than the other, elliptic or oblong-elliptic, the apex shortly acuminate, the base narrowed and sometimes slightly oblique; upper surface always glabrous and shining, when young dark green, when dry dark-brown, the nerves indistinct; lower surface glabrous or puberulous, when fresh whitish beneath and the nerves red, when dry reddish, and the nerves dark; main-nerves 7 to 15 pairs, curved, spreading; length 2 to 5 in.; breadth .7 to 2.25 in.; petioles .3 to 1 in. *Stipules* linear or subulate from broad bases, .15 to .2 in. long, fugacious. *Cymes* terminal, much shorter than the leaves, with spreading branches 1 to 3 in. in diam., ebracteolate, glabrous or puberulous, the peduncles .35 to 1.5 in. long. *Flowers* on short pedicels, sub-secund, glabrous or puberulous, .6 in. long. *Calyx* rather more than .1 in. long, wide, cylindric with 5 acute triangular dorsally ridged erect teeth. *Corolla* four times as long as the calyx, cylindric, widening somewhat towards the 5 short broad blunt lobes of the mouth. *Capsule* narrowly obreniform, .25 in. across, glabrous or pubescent, prominently 5-ridged. *Seeds* numerous, small, brown. Gaertn. Fruct. I. t. 55; Roxb. Fl. Ind. I. 701; W. & A. Prod. Fl. Pen. Ind. 404; Hook. fil. Fl. Br. Ind. III. 77.

In all the provinces, common and variable in size and pubescence.—
DISTRIB. British India; Ceylon; Sumatra; Java.

6. *OPHIORHIZA HARRISIANA*, Heyne, var. *ARGENTEA*, Hook. fil. Fl. Br. Ind. III. 78. *Stems* woody below, 6 to 18 in. high, branching, terete, glabrous, dark-coloured when dry. *Leaves* unequal, membranous, narrowly oblong-lanceolate, much tapered to each end, the base narrow

and somewhat oblique; upper surface dark olivaceous-brown when dry, sparsely puberulous or glabrous, the main-nerves obscure; the lower pale (glaucous), pinkish, glabrous except for a few scattered hairs on the prominent midrib and 6 to 10 pairs of oblique slightly curved dark-coloured broad main-nerves; length 1·5 to 3·5 in.; breadth ·65 to ·85 in.; petioles ·15 to ·5 in. *Stipules* lanceolate or oblong, ·25 in. long. *Cymes* terminal, solitary or several together on the apices of the branches and stem, shorter than the leaves, the branches shorter than the peduncle, puberulous. *Flowers* ·35 in. long, sessile or on short pedicels, secund. *Calyx* ·1 in. long, cylindric, with 5 erect triangular acute teeth much shorter than the tube. *Corolla* ·3 in. long, puberulous externally like the calyx, cylindric, slightly widened near at the apex; lobes 5, short, broad, 1-nerved. *Capsules* obreniform with very shallow sinus, glabrous, ·15 to ·25 in. across. *O. argentea*, Wall. Cat. 6229.

PERAK: *Scortechini* 432 (in part) 634; *Wray* 1984, 3647; *Curtis* 3147; *Yapp* 539. PAHANG: *Ridley* 2202. SELANGOR: *Kelsall* 1989.—DISTRIB. Khasia Hills.

7. *OPHIORHIZA TENELLA*, King n. sp. Erect or decumbent, 6 to 12 in. high. *Stem* slender, much branched, covered with minute yellowish pubescence. *Leaves* membranous, those in a pair sub-equal, elliptic-ovate to ovate-lanceolate, sub-acute, sometimes rounded but usually rather abruptly narrowed at the base; upper surface olivaceous when dry, glabrous except for a very few scattered short thick hairs; lower surface pale greenish-yellow, minutely puberulous on the broad midrib and 6 to 8 pairs of spreading rather straight main-nerves; length 1 to 2 in.; breadth ·5 to 1 in.; petiole ·1 to ·25 in., puberulous. *Stipules* short, cupular, obscurely toothed, less than ·1 in. deep. *Cymes* solitary, terminal, few-flowered, pedunculate, shorter than the leaves. *Flowers* ·3 in. long, almost sessile. *Calyx* less than ·1 in. long, cylindric with 5 lanceolate spreading 1-nerved lobes shorter than the tube, covered with short coarse hair. *Corolla* ·25 in. long, funnel-shaped; the tube slightly dilated near the base; the 5 lobes ovate-lanceolate, sub-acute, spreading, sub-reflexed. *Capsule* narrowly obreniform, sub-glabrous, ·25 in. across.

PERAK: *King's Collector* 499, 546. PAHANG: *Ridley* 2201.—DISTRIB. Burma.

8. *OPHIORHIZA RUGOSA*, Wall. Cat. 6235. Herbaceous, sub-erect, 4 to 6 in. high, the stem unbranched, thicker than a crow-quill, tomentose. *Leaves* unequal, membranous, oblong-ob lanceolate, or oblong, sub-acute, or shortly and bluntly acuminate, the base narrowed; upper surface dark olivaceous when dry, glabrous or with few scattered short thick hairs, the nerves and midrib inconspicuous; lower surface pale olivaceous, with coarse short pubescence on the midrib, reticulations and 12 to

14 pairs of thick curved spreading nerves; length 1 to 3·5 in.; breadth ·5 to 1·25 in.; petioles ·2 to ·4 in., pubescent. *Stipules* narrowly linear-lanceolate from a broad base, ·2 in. long. *Cymes* solitary, terminal or from the upper axils, pedunculate, shorter than the leaves; branches few, short, in dichotomous umbels an inch or less across; peduncles pubescent like the branches. *Flowers* less than ·05 in. long (♀ cleistogamic) in groups of 3 or 4 enveloped in oblong blunt, pubescent bracts longer than themselves. *Calyx* cylindric, 5-toothed. *Corolla* slightly exceeding the calyx, cylindric, 5-toothed. *Anthers* 5, oblong, short, included. *Capsules* oblong-reniform with shallow sinus, pubescent, ·2 in. across. *O. Harrisiana*, Heyne, var. *rugosa*, Hook. fil. Fl. Br. Ind. III. 78.

PERAK: at 3900 feet, Wray 1482.—DISTRIB. Nepal and Sikkim Himalaya.

9. *OPHIORHIZA TOMENTOSA*, Jack in Roxb. Fl. Ind. ed Carey & Wall. II. 546. Erect, 8 to 12 in. high; stem woody near the base, thinner than a goose-quill, sparsely clothed with flexuose hairs. *Leaves* membranous, the two of a pair unequal in size, narrowly elliptic to elliptic-oblong, acute, the base narrowed, slightly oblique; upper surface olivaceous-green when dry, with sparse curved white stiff hairs; the lower pale, with numerous white hispidulous hairs between the main-nerves, the hairs on the broad prominent midrib and 8 to 12 pairs of curved spreading main-nerves brown; length 1·75 to 3·75 in.; breadth ·75 to 1·25 in.; petioles ·2 to ·8 in., stout, pubescent. *Stipules* linear, curved, about ·1 in. long, deciduous. *Cymes* terminal, solitary, pedunculate; shorter than the leaves, few-branched; peduncles 1 to 2 in. long, pubescent. *Flowers* ·25 in. long, on pubescent pedicels shorter than themselves. *Calyx* tubular, about ·05 in. long, obscurely toothed. *Corolla* salver-shaped; the tube narrow, the lobes blunt. *Capsules* obreniform, puberulous, rather less than ·2 in. across. Wall. Cat 6231; Hook. fil. Fl. Br. Ind. III. 79; Miq. Fl. Ind. Bat. II. 174.

PENANG: King; Curtis 907; King's Collector 1314. PERAK: King's Collector 4846; Curtis 3257.

10. *OPHIORHIZA KUNSTLERI*, King n. sp. Stem erect, woody at the base, not branched, about a foot high, dark-coloured, deciduously rusty-puberulous. *Leaves* membranous, sub-equal, elliptic or ovate-elliptic, shortly and abruptly acuminate, the base rounded or slightly cuneate; upper surface dark-brown, sparsely strigose, the midrib distinct but the main-nerves faint; lower pale yellowish-brown, hispidulous chiefly on the stout prominent midrib and 10 to 14 pairs of spreading slightly curved rather bold nerves; the edges minutely ciliate; length 3·5 to 5 in.; breadth 1·75 to 2·5 in.; petioles ·5 to 1·75 in., bearing a few scattered hairs. *Stipules* lanceolate, acuminate, ·2 in. long, hairy,

deciduous. *Cymes* solitary in the axils of the upper leaves or terminal, pedunculate, much shorter (peduncle included) than the leaves when in flower and rather more than half as long in fruit, everywhere rusty-pubescent, the branches few, obliquely umbellate. *Flowers* numerous, in two secund rows on the branches, rather more than 1 in. long, on short hirsute pedicels, and intermixed with lanceolate hirsute or ciliate bracteoles. *Calyx* campanulate, with truncate entire mouth. *Corolla* scarcely longer than the calyx, widely cylindric. *Anthers* 5, oblong, versatile, dorsified. *Capsule* obreniform, the sinus large, rusty-pubescent, .2 in. across.

PERAK: *King's Collector* 8247.

A species allied to *O. tomentosa*, Jack. var. *glabrata* and *O. trichocarpa*, Bl., but the leaves of this are larger and much broader and the hairs on them are larger and more yellow in colour.

15. LUCINAEAE, DC.

Erect shrubs or epiphytic climbers, glabrous or nearly so. *Leaves* usually coriaceous. *Flowers* in axillary or terminal, solitary or paniced, pedunculate heads. *Calyx-tube* turbinate; the limb annular or cupular, entire, persistent. *Corolla* funnel-shaped, white; the tube densely pilose inside; the limb coriaceous, with 4 or 5 oblong-lanceolate valvate lobes. *Stamens* 4 or 5, inserted in the tube on short villous filaments or sessile; *anthers* dorsifixed, linear-oblong, included. *Ovary* 2-celled; *style* filiform or thickened below the middle; *stigmas* 2, linear or spatulate; *ovules* numerous, on fleshy peltate placentas. *Fruits* baccate, surmounted by the truncate calyx-limb, sub-confuent. *Seeds* compressed; the testa smooth, coriaceous; embryo minute, in fleshy albumen.—DISTRIB. Species about 18, all Malayan.

- | | | | |
|--|-----|-----|----------------------------|
| Flower heads in a terminal panicle | ... | ... | 1. <i>L. paniculata</i> . |
| Flower heads solitary or in fascicles of three:— | | | |
| All parts quite glabrous; corolla .75 in. long | ... | ... | 2. <i>L. Ridleyi</i> . |
| Young branches and inflorescence pubescent:— | | | |
| Leaves membranous, much narrowed at the base; | | | |
| flowers 5-merous | ... | ... | 3. <i>L. membranacea</i> . |
| Leaves coriaceous, with broad rounded bases, flowers | | | |
| 4-merous | ... | ... | 4. <i>L. Morinda</i> . |

1. LUCINAEAE PANICULATA, King n. sp. Glabrous; young branches thinner than a goose-quill, glabrous, brown when dry. *Leaves* oblanceolate to elliptic, shortly and rather abruptly acuminate, the base narrowed to the rather stout petiole; both surfaces glabrous, brown when dry, the lower paler and with the reticulations visible; midrib strong on both surfaces; main-nerves about 10 pairs, spreading slightly ascending and little curved; length 6 to 10 in.; breadth 2.25 to 4.25 in.; petioles

·8 to 1·5 in. ; stipules ovate-lanceolate, vaginate in the lower half, ·4 to ·8 in. long. *Heads* in a pedunculate terminal panicle 5 or 6 in. long, its branches about half an inch to one inch long, thick, each bearing at its apex a head of three or four sessile flowers confluent by their bases ; the common peduncle of the panicle with a sheathing basal bract ·5 in. long. *Calyx* truncate. *Fruit* unknown.

PERAK : *Scortechini* ; *King's Collector* 2164.

2. *LUCINAEA RIDLEYI*, King n. sp. Epiphytal ; young branches thinner than a goose-quill, terete, glabrous, dark-brown when dry. *Leaves* thinly coriaceous, quite glabrous, obovoid-oblong to narrowly elliptic, acute or shortly and abruptly acuminate, much narrowed at the base ; upper surface brown when dry, the lower paler minutely punctate, reticulate ; main-nerves 6 to 8 pairs, spreading, faint, the intermediate almost as prominent, the midrib bold ; length 4 to 6 in. ; breadth 1·5 to 2·5 in. ; petioles ·75 to 1 in. *Stipules* lanceolate, oblong, sub-acute, connate and cartilaginous at the base, ·5 to ·75 in. long. *Peduncle* solitary, terminal, about ·1 in. long, each bearing a dense head about 1 in. in diam. (when dry), consisting of 8 to 12 sessile flowers. *Calyx* sub-quadrangular, the limb truncate. *Corolla* ·75 in. long, thick, ovate-oblong in bud, the narrowly oblong lobes as long as the tube. *Fruit* ·4 to ·6 in. long, crowned by the wide truncate calyx-limb.

SINGAPORE : *Lobb*. PERAK : *Scortechini* 306, 639 ; *Wray* 446 ; *Ridley* 2923 ; *King's Collector* 2162, 5052, 7836.—DISTRIB. Borneo, *Beccari* 3505.

3. *LUCINAEA MEMBRANACEA*, King n. sp. An epiphytic woody shrub ; young branches terete, thinner than a goose-quill, covered with a dense coat of minute rusty deciduous pubescence. *Leaves* membranous, oblong-elliptic or narrowly elliptic, acute or shortly acuminate, narrowed (rarely rounded) at the base, upper surface quite glabrous, brown when dry ; the lower paler, puberulous on the midrib ; main-nerves 8 or 9 pairs, faint, spreading ; length 3·5 to 5 in. ; breadth 1·25 to 2·25 in. ; petioles ·1 to ·15 in. ; stipules broadly ovate, carinate, pubescent, and vaginate near the base, ·5 to ·75 in. long. *Peduncles* unequal, terminal or in fascicles of 2 or 3, the longer 1 in. long, the shorter as little as ·2 in. long, all dilated at the apex and pubescent, and each bearing a head about ·75 in. in diam. consisting of 8 to 10 sessile flowers. *Calyx*-limb truncate. *Corolla* thick ; the tube cylindrical, ·15 in. long, hairy inside in its upper half ; the limb with 5 lanceolate reflexed glabrous lobes shorter than the tube, the tips of the lobes incurved ; *anthers* 5, sessile, linear. *Style* exserted, hairy in the upper half. *Fruits* subglobular, confluent at the base, ·15 in. in diam.

PERAK : *Scortechini* 283 ; *Curtis* 2016 ; *Ridley* 5543 ; *Wray* 832, 177,

3998; *Scortechini* 47, 283, 603; *King's Collector* 762, 10152.—DISTRIB. Borneo.

Allied to *L. Morinda*, DC., but the leaves of that species are more coriaceous, have more main-nerves and broader bases. The flowers moreover of this are 5-merous and of that 4-merous.

4. LUCINAEA MORINDA, DC. Prod. IV. 368. Young branches thinner than a goose-quill, puberulous but ultimately glabrous. *Leaves* coriaceous, glabrous, lanceolate to elliptic-oblong, rarely somewhat obovate, brown when dry; apex acute or sub-acute, the base rounded or minutely cordate; main-nerves 8 to 12 pairs, faint, spreading, slightly curved; length 1.5 to 2.5 in.; breadth .9 to 1.25 in.; petiole .15 to .25 in., slender; *stipules* triangular. *Peduncles* solitary or in fascicles of three, usually terminal but sometimes axillary, pubescent, about 1 in. long. *Heads* .75 in. in diam., 8- to 10-flowered. *Calyx* with a short truncate limb. *Corolla* .2 in. long, sessile. *Berries* crowded, broadly turbinate, glabrous. Wall. Cat. 8437. *Morinda polysperma*, Jack. in Mal. Misc. I. 14; Roxb. Fl. Ind. ed. Carey & Wall. II. 204; Hook. fil. Fl. Br. Ind. III. 93.

MALACCA: *Griffith* (K.D.) 2954; *Ridley* 1598; *Maingay* (K.D.) 875. PENANG: *Wallich* 8437. PERAK: *Curtis* 1337. SELANGOR: *Ridley* 3819. PAHANG: *Ridley* 1093. PERAK: *Scortechini* 283; *Wray* 2405, 4211; *King's Collector* 4645, 5498, 8482. SINGAPORE: *Jack*.—DISTRIB. Malay Archipelago. Always littoral.

16. LECANANTHUS, Jack.

A small glabrous shrub. *Flowers* crowded in involucrate axillary, sessile or pedunculate, nodding heads. *Calyx-tube* ovoid or turbinate; the limb oblique, campanulate, with 2 to 4 short obtuse unequal lobes, or 2-lipped, persistent. *Corolla* funnel-shaped; the tube inflated below; the limb with 5 thick obtuse bearded lobes, valvate in bud. *Stamens* 5, inserted by short filaments in the throat of the corolla; *anthers* bifid below. *Disk* urn-shaped. *Ovary* 2-celled; style slender, with 2 linear or oblong stigmas; ovules numerous; placentas spongy, attached to the septum. *Fruit* membranous, 2-celled, pulpy, many-seeded, placentas thick. *Seeds* obtusely angled, the testa smooth, thick; embryo small, in fleshy albumen.—A single species.

LECANTHUS ERUBESCENS Jack in Mal. Misc. II. 83. Glabrous everywhere except the calyx. *Stem* with 4 angles, two of them acute, 12 to 18 in. high. *Leaves* thickly membranous, ovate-elliptic to narrowly oblong, shortly acuminate, tapering below to the short petiole; main-nerves about 7 pairs, curved, ascending, faint, the veins distinct; length 3 to 8 in.; breadth 1.25 to 3 in. *Stipules* ovate-lanceolate, acuminate,

3 or 4 in. long. *Heads* sub-globular, .75 to 1 in. in diam. (when dry). *Flowers* sessile, pale red. *Calyx* coloured, pubescent, wider than the corolla, those of the outer flowers 2-lipped and imbricate. Wall. in Roxb. Fl. Ind. ed. Carey & Wall. II. 319; Wall. Cat. 6224; DC. Prod. IV. 620; Miq. Fl. Ind. Bat. II. 153, 199; Ann. Mus. Lugd. Bat. IV. 132; Hook. fil. Fl. Br. Ind. III. 100. *Lecananthus* sp. Griff. Notul. IV. 272.

SINGAPORE: Wallich, Lobb, Ridley 384. SELANGOR: Ridley. PERAK: King's Collector 1949, 2135, 10153; *Scortechini* 1275; Wray 1936, 2649. PANGKOR: Curtis 1640. PENANG: Curtis 1643. MALACCA: Griffith (K.D.) 2784; Maingay (K.D.) 912.—DISTRIB. Borneo; Sumatra.

17. COPTOPHYLLUM, Korthals.

Small erect simple shrubs with oblanceolate sparsely hairy leaves and ciliate stipules. *Flowers* pentamerous, crowded in bracteate capitules the outer bracts large and forming an involucre. *Calyx*-tube ovoid, its limb with 5 oblong ciliate lobes. *Corolla*-tube subinfundibuliform, its throat naked; the limb with 5 rather blunt lobes. *Stamens* 5, inserted below the middle of the corolla; *anthers* short, included. *Disk* annular, glandular. *Ovary* 2-celled, with numerous ovules on hemispheric placentas; *style* with 2 truncate arms. *Capsule* membranous, 2-celled. *Seeds* sub-rhomboid, scrobiculate; albumen fleshy; embryo clavate.—Two or three species; Malayan.

COPTOPHYLLUM CAPITATUM, Miq. Fl. Ind. Bat. II. 348. Herbaceous; stems compressed, thinner than a goose-quill, covered with short coarse rusty pubescence. *Leaves* membranous, oblanceolate, with a short blunt abrupt apiculus, the base much narrowed; upper surface dark-brown, sparsely and coarsely strigose, the lower paler brown, coarsely puberulous on the midrib nerves and transverse reticulations, otherwise glabrous; main-nerves 9 or 10 pairs, curved, ascending; length 5.5 to 7.5 in.; breadth 1.5 to 2.5 in.; petiole .5 to 1.25 in. *Stipules* .4 in. long, lanceolate with broad bases, the apices very acuminate, glabrous but the edges ciliate. *Peduncles* solitary, axillary, slender, compressed, sparsely hispid, 2 to 3 in. long, bearing at their apices single involucreate capitules. Involucre of 4 or more broadly ovate, sub-acute boldly 3-nerved bracts 4 in. long, the nerves and edges hispid. *Flowers* .2 in. long, glabrous, numerous, crowded, mixed with linear or spatulate fimbriate bracteoles about as long as themselves; pedicels short. *Calyx* with cylindric campanulate tube; the mouth with 5 linear fimbriate-ciliate lobes longer than the tube. *Capsule* narrowly ovoid, crowned by the persistent calyx-lobes and within these by a mamillate disc, 2-celled, the placentas with rather numerous large shining brown pitted seeds.

JOHOR: Ridley 4179. SELANGOR: Ridley 8539. PERAK: King's Collector 10334.—DISTRIB. Sumatra.

Ridley's specimen collected in Johor (Herb. Ridley 4179) has stipules with blunt lobes and the bracts of the involucre are more numerous. It may be a new species.

18. MUSSAENDA, Linn.

Erect or scandent shrubs or undershrubs, rarely herbs. *Leaves* opposite or in whorls of three, membranous. *Stipules* solitary or in pairs between the petioles, free or connate, usually deciduous. *Flowers* in terminal cymes, the bracts and bracteoles deciduous. *Calyx-tube* oblong or turbinate; the limb with 5 mostly deciduous lobes, one of them however sometimes large petiolate petaloid (white or coloured), and persistent. *Corolla* funnel-shaped; the tube elongate, often sericeous outside, the throat always villous, the limb with 5 valvate lobes. *Stamens* 5, inserted on the throat or below it on short filaments; *anthers* linear. *Ovary* 2-celled, style filiform; *stigmas* 2, linear; *ovules* numerous, on peltate fleshy placentas. *Fruit* baccate, crowned by the scar of the deciduous calyx. *Seeds* minute, the testa pitted; embryo small, in dense fleshy albumen.—DISTRIB. Species about 40, in the tropics of Asia and of Africa, and in Polynesia.

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|--|-----|-----|--------------------------|
| None of the calyx-lobes petaloid | ... | ... | 1. <i>M. mutabilis</i> . |
| One of the calyx-lobes sometimes petaloid:— | | | |
| Lobes of the calyx persistent in the fruit:— | | | |
| Leaves conspicuously hairy on both surfaces:— | | | |
| Corolla not much longer than the calyx:— | | | |
| Whole plant densely covered with long soft hair | | 2. | <i>M. Wrayi</i> . |
| Lobes of the calyx not persistent in the fruit:— | | | |
| Leaves conspicuously hairy on both surfaces:— | | | |
| Corolla much longer than the calyx:— | | | |
| An erect shrub; leaves slightly narrowed to the base; petioles less than .5 in. long | ... | 3. | <i>M. macrophylla</i> . |
| Scandent; leaves much narrowed to the base; petioles often as much as 1 in. long | ... | 4. | <i>M. villosa</i> . |
| Leaves glabrous or nearly so:— | | | |
| Leaves oblong or lanceolate, much longer than broad:— | | | |
| Leaves with broad rounded or cordate bases | ... | 5. | <i>M. cordifolia</i> . |
| Leaves much narrowed to the base:— | | | |
| Main-nerves 9 or 10 pairs | ... | 6. | <i>M. polyneura</i> . |
| Main-nerves 5 or 6 pairs | ... | 7. | <i>M. glabra</i> . |
| Leaves obovate-oblong to elliptic-oblong, about twice as long as broad:— | | | |
| Calyx and corolla glabrous or nearly so | ... | 8. | <i>M. oblonga</i> . |
| Calyx and corolla pubescent | ... | 9. | <i>M. Teysmanniana</i> . |
| Imperfectly known species | ... | 10. | <i>M. membranacea</i> . |

1. *MUSSAENDA MUTABILIS*, Hook. fil. Ic. Plant 1718. A climber, 15 to 40 feet long; young branches thinner than a goose-quill, terete, glabrous. *Leaves* membranous, on rather long petioles, broadly elliptic to elliptic-rotund from near the base; apiculate or shortly triangular acuminate at the apex, both surfaces glabrous; main-nerves 7 to 9 pairs, curving upwards, thin but prominent on the lower surface when dry; the reticulations open and transverse; length 5 to 7 in.; breadth 3 to 4.5 in.; petiole .75 to 1.25 in. *Stipules* forming an irregularly toothed pubescent ring of teeth of an inch or less in depth. *Cymes* terminal, much shorter than the leaves even in fruit, 2-branched, the stipules shorter than those of the stem. *Flowers* 1.5 to 2 in. long, from 8 to 12; bracteoles few, like the calyx-lobes but smaller. *Calyx-lobes* equal, lanceolate sometimes linear-lanceolate, acuminate, sparsely strigose externally, tomentose within, less than half as long as the corolla-tube, deciduous in the fruit. *Corolla* orange red, the limb about 2 in. across when fresh, the lobes elliptic-oblong, acute, with short coarse hairs on both surfaces; the tube cylindric, .1 in. wide, very slightly expanded towards the apex, adpressed-pilose externally, pubescent internally. *Fruit* cylindric sub-clavate, glabrous, faintly ridged, the apex blunt, narrowed at the base to the short pedicels; length .5 to .7 in.; diameter about .3 in. *Mussaenda Kintaensis*, Brace MSS. in Herb. Calc. *Acranthera Maingayi*, Hook. fil. Fl. Br. Ind. III. 192. *A. mutabilis*, Hems. Journ. Bot. 1877, 204. *Mussaenda Maingayi*, Stapf Trans. Linn. Soc. IV. 172.

PERAK: *King's Collector* 91, 855, 1856, 3276, 4255, 4999; *Wray* 1846; *Scortechini* 770; *Curtis* 2023. PENANG: *Ridley* 2187. JOHOR: *King* 559. MALACCA: *Derry* 1214. SINGAPORE: *Ridley* 1643.

VAR. *hirsuta*; under surfaces of leaves and young stems pubescent; all parts of the inflorescence villose-pubescent; stipules apiculate and twice as long as in the type.

PERAK: *King's Collector* 225. MALACCA: *Derry* 253. SINGAPORE: *Ridley* 1643.

2. *MUSSAENDA WRAYI*, King n. sp. A climber or occasionally a spreading shrub; young stems thinner than a goose-quill, covered like the leaves inflorescence and flowers with stiff more or less rusty hairs. *Leaves* membranous, elliptic or obovate-elliptic, much narrowed to the base, the apex shortly acuminate; main-nerves 9 to 14 pairs, curving upwards, thin but prominent on the lower surface; length .4 to .8 in.; breadth 1.75 to 4 in.; petiole .35 to .75 in.; stipules free, lanceolate-acuminate, about .25 in. long. *Cymes* solitary, terminal, condensed in flower, spreading in fruit, shorter than the leaves, the bracts lanceolate. *Calyx* densely pilose, infundibuliform, .5 to .7 in. long; the mouth with 5 deep lanceolate usually equal teeth, occasionally one of the teeth petaloid,

white, veined with green, narrowly elliptic or oblanceolate, acute, tapered to a short petiole, 3-nerved and with prominent reticulations, sparsely strigose, under 2 in. in length and less than half as broad. *Corolla* slightly longer than calyx, red, very pilose; the tube cylindric; the limb .4 or .5 in. across, with 5 broad short blunt lobes. *Fruit* oblong-ovoid, sparsely pilose, about .5 in. long and .3 in. in diam., crowned by the long persistent calyx-lobes.

PERAK: Wray 40, 1788, 2583; *King's Collector* 685, 1960, 10943, 5353? *Scortechini*; *Curtis* 1024. PENANG: *Curtis* 2730, 3304.

3. *MUSSAENDA MACROPHYLLA*, Wall. in Roxb. Fl. Ind. ed. Carey & Wall. II. 228. A shrub; young branches thinner than a goose-quill, rusty-pilose. *Leaves* thickly membranous, elliptic-oblong, slightly narrowed at the base, the apex shortly acuminate; upper surface sparsely strigose, the midrib rusty-pilose, the lower rusty-pilose especially on the midrib and nerves; main-nerves 9 to 11 pairs, slightly curved, ascending, prominent on the lower less so on the upper surface when dry; length 3 to 5 in.; breadth 1.5 to 2 in.; petiole .2 in.; stipules triangular, densely pilose, about .25 in. long. *Oymes* solitary, terminal, shorter than the leaves and condensed when in flower, many-flowered. *Calyx* about .5 in. long, narrowly infundibuliform, cut half way down into equal lanceolate teeth, pilose outside especially on the tube: enlarged lobe ovate, acuminate, 2 or 3 in. long, sparsely pubescent, with greenish ascending nerves; its petiole slender, about 1 in. long. *Corolla* yellow, twice as long as the calyx, densely pilose outside; the tube cylindric, widening in its upper half; the limb .3 or .4 in. in diam. with broad blunt lobes. *Fruit* unknown. Wall. Pl. As. Rar. II. 77, t. 180; Bot. Reg. XXXII. t. 24; DC. Prod. IV. 370. Wall. Cat. 6255. *M. hispida*, Don Prod. 139; DC. Prod. l.c. *M. frondosa*, Wall. Cat. 6250 A.

PERAK: *King's Collector* 6016. MALACCA: *Maingay* (K.D.) 835/2, 941.—DISTRIB. British India; Philippine Islands.

I follow the Flora of British India in referring this plant to *M. macrophylla*, Wall., but I have some doubt as to the accuracy of this view. The plant here described approaches, *M. villosa* very closely, and it is difficult to distinguish the two by words although specimens of the two look very different.

4. *MUSSAENDA VILLOSA*, Wall. Cat. 6254. A climber; young branches much thinner than a goose-quill, deciduously rusty-pilose. *Leaves* membranous, oblong, elliptic-ovate or -acute, much narrowed to the base, the apex shortly acuminate or acute, both surfaces (but especially the lower) sparsely pilose; main-nerves 9 to 12 pairs, thin but prominent on the lower surface (when dry), slightly curved, ascending; length 3 to 5 in.; breadth 1.25 to 2.25 in.; petiole .25 to 1 in., pilose; stipules lanceolate, caudate-acuminate, pilose, .4 in. long. *Oymes* ter-

minial and axillary, condensed when in flower, the branches very pilose; bracts narrowly oblong, .3 in. long. *Calyx* .3 to .4 in. long, pilose, the tube narrowly campanulate, shorter than the linear-lanceolate acuminate teeth; the odd lobe occasionally petaloid, ovate-rotund, bluntly acuminate, slightly narrowed to the long petiole, 5-nerved, glabrous above, pubescent below on the nerves, shorter than the leaves. *Corolla* yellow, .75 in. long, more than three times as long as the calyx, narrowly cylindric in its lower half, slightly wider in the upper half; the limb only about .25 in. in diam., its lobes short, broad; the mouth closed by a mass of thick short hairs. *Fruit* oblong-clavate, with lax deciduous white hairs, about .5 in. long and .25 in. in diam. Hook. fil. Fl. Br. Ind. III. 191 (*among doubtful species*).

PERAK: *Scortechini* 240, 243; *Yapp* 213, 341; *Schomburgk* 17; *Curtis* 1024. PENANG: *King* 600; *King's Collector* 1755; *Curtis* 289, 1934. LANKAWI: *Curtis* 2871. PAHANG: *Ridley* 2188. KEDAH: *Curtis* 2521.

This species was (no doubt from want of good specimens) treated in the Flora of British India as a doubtful one. Since the Flora was written better specimens have been obtained.

VAR. *Herveyana*, King; leaves broadly ovate or elliptic, shortly and abruptly acuminate, smaller than in the typical form and densely clothed on the lower (less so on the upper) surface with soft white hairs; the young branches and inflorescence with smaller hairs.

MALACCA: *Hervey*.

5. *MUSSAENDA CORDIFOLIA*, Wall. Cat. 6260. A climber 20 to 60 feet long; young branches thinner than a goose-quill, terete, glabrous. Leaves thinly coriaceous, oblong, acute or shortly and bluntly acuminate, only slightly narrowed to the rounded, often slightly cordate base (occasionally narrowed to the base); both surfaces quite glabrous, the lower with distinct transverse reticulations; main-nerves about 8 pairs, curved, ascending, thin, slightly depressed on the upper surface and prominent on the lower; length 5 to 6.5 in.; breadth 1.75 to 2.5 in.; petiole .2 to .25 in.; rusty adpressed-pilose; stipules free, lanceolate, much acuminate, deciduously hirsute at the base. *Cymes* terminal and axillary, on long slender peduncles, many-flowered, rather lax, sparsely adpressed rusty-pubescent; bracts few, about .15 in. long. *Calyx* .2 in. long, cylindric-campanulate, the lobes linear-lanceolate, shorter than the tube, spreading, one occasionally enlarged (2 to 2.5 in. long) and petaloid, ovate-oblong, creamy white, glabrous, with 5 or 6 pairs of ascending puberulous nerves, its petiole slender, .5 to .75 in. long. *Corolla* nearly 1 in. long, adpressed-pubescent outside, the tube narrowly cylindric, slightly widening upwards, the limb only .2 in. wide, its lobes ovate

acute, spreading, pubescent on both surfaces. *Fruit* broadly sub-ovoid, glabrous, crowned by the small cicatrix of the deciduous calyx-lobes, .35 in. long and about .25 in. in diam. *M. glabra*, Wall. Cat. 6251 sheets B. and C. *M. glabra*, Hook. fil. (not of Vahl) Fl. Br. Ind. III. 91 var. 4 and part of vars. 2 and 3.

PENANG: *King* 603; *Curtis* 116; *Deschamps*. PERAK: *King's Collector* 4859, 5216; *Scortechini* 458; *Maingay* (K.D.) 834. MALACCA: *Griffith* (K.D.) 2778 (in part).—DISTRIB. Mergui *Griffith* Herb. prop. 160.

The Wallichian No. 6260 consists of a single gathering from Penang and it was issued under this name. The same species forms, however, part of the Wallichian material distributed under the name *M. glabra*, the remarks under which may be read in the present connection.

6. MUSSAENDA POLYNEURA, King n. sp. Resembling *M. glabra*, Vahl, but having leaves with 9 or 10 pairs of little-curved ascending main-nerves with deciduous adpressed rufous hairs; the inflorescence and flowers, including the enlarged calyx-lobe, rusty pubescent. *M. glabra*, Wall. Cat. 6251 A. Hook. fil. Fl. Br. Ind. III. var. 4 in part.

MALACCA: *Griffith* (K.D.) 2776. PERAK: *King's Collector* 5775; *Wray* 1424.

This is one of the three species included under Wall. Cat. 6251 A.

7. MUSSAENDA GLABRA, Vahl Symb. Bot. III. 38. A climber; young shoots much thinner than a goose-quill, angled, with dark-coloured glabrous lenticellate bark. *Leaves* oblong-lanceolate, sometimes elliptic, the base narrowed and the apex shortly acuminate, glabrous except for some pubescence on the midrib and nerves; main-nerves 5 or 6 pairs curving upwards, thin but prominent on the lower surface when dry; length 2.5 to 3.5 in., breadth .5 in to 1.6 in., rarely 2 in.; petiole about .2 in.; stipules free, broad, bifid, the lobes acuminate, .2 to .3 in. long, puberulous. *Oxyes* solitary on the apices of the terminal and lateral branches, longer than the leaves, their branches at first sometimes crowded but in fruit always lax, many-flowered, softly puberulous; bracts few, lanceolate, .2 in. long. *Calyx* narrowly campanulate, .2 in. long, the mouth with short spreading linear-lanceolate pubescent teeth; the tube sub-glabrous; occasionally one lobe petaloid (white), glabrous, ovate-acute, rounded at the base or narrowed to the long petiole with about 5 nerves radiating from the base, smaller than the leaves. *Corolla* yellow, pubescent, about four times longer than the calyx, narrowly cylindric but somewhat dilated in its upper fourth; the limb only .2 in. across, its lobes spreading, triangular. *Fruit* oblong, slightly narrowed at the base and apex, the latter crowned by the scar of the deciduous calyx-lobes,

·5 in. long and ·3 in. in diam. when dry. DC. Prod. IV. 370; Wall. Cat. 6251 sheet A only and in part; Kurz. For. Fl. Burm. II. 56; Hook. fil. Fl. Br. Ind. III. 90 (*in part*).

MALACCA: *Maingay* (K.D.) 834; *Griffith* (K.D.) 2779. SINGAPORE: *Ridley* 116. MALACCA: *Derry* 31.—DISTRIB. British India.

VAR. *puberula*, upper surface of leaves glabrous except the puberulous midrib and nerves; lower surface puberulous or pubescent on the reticulations and sometimes on the interspaces also. *M. glabra* Vahl, VAR. 2: Hook. fil. l.c. 91.

SINGAPORE: *Walker* 65; *Anderson* 77; *Schomburgk* 43; *Ridley* 116a, 846a, 3651.

Under the No. 6251 and the name *M. glabra*, Wallich issued three gatherings bearing the letters A, B, and C. The gathering B was received from Herb. Finlayson, and the locality of its collection is unknown. Gathering C was received from Penang. Both these are the same as the plant issued as *M. cordifolia* and as No. 6260. The remaining gathering (A), as preserved in the Wallichian Herbarium in possession of the Linnean Society of London consist of three twigs, for one of which with almost glabrous flowers the name *M. glabra* is arbitrarily retained. Of the other two one has been referred by Sir Joseph Hooker to *M. Wallichii*, G. Don, and the third belongs to the species which I have named *M. polyneura*.

8. MUSSAENDA OBLONGA, King n. sp. A shrub 6 to 8 feet high; young branches as thick as a goose-quill, angled, somewhat compressed, pale, striate, sparsely lenticellate, glabrous. *Leaves* membranous, elliptic or obovate-oblong or obovate-lanceolate, much narrowed to the base, the apex shortly and rather abruptly caudate-acuminate; both surfaces glabrous, the lower pale (when dry); main-nerves 6 to 9 pairs, curved-ascending, slightly conspicuous; length 5·5 to 9·5 in.; breadth 1·75 to 3·5 in.; petiole ·4 to ·8 in., puberulous or glabrous; stipules triangular, linear-acuminate, glabrous, ·25 to ·4 in. long. *Oymes* solitary, terminal, shortly pedunculate, much shorter than the leaves even when in fruit, umbellate, lax, wide-spreading; the branches somewhat compressed, glabrous; bracts linear-lanceolate, ·2 in. long. *Calyx* ·3 to ·4 in. long, glabrous; the tube cylindric, slightly expanded above the base, its mouth with linear erect teeth shorter than or as long as the tube. *Corolla* pale yellow, twice as long as the calyx; the tube cylindric; the limb ·4 in. in diam., its lobes narrowly lanceolate. *Fruit* globular-ovoid, sometimes sub-obovoid, the apex broad, crowned by the cicatrix of the deciduous calyx. *M. longifolia*, Wall. Cat. 6258, (not of Lam.) *M. Wallichii*, G. Don, Hook. fil. Fl. Br. Ind. III. 88 (not of Don).

PERAK: *King's Collector* 1935, 3542; *Curtis* 3303.

9. MUSSAENDA TEYSMANNIANA, Miq. Fl. Ind. Bat. II. 213. A climber; young branches somewhat thinner than a goose-quill, terete, deciduously adpressed rusty-pilose, and with elongated lenticels. *Leaves*

membranous, broadly elliptic to obovate-oblong, shortly acuminate, more or less narrowed at the base; both surfaces of the young leaves (but especially the paler lower one) with minute adpressed rusty hair, the older glabrous except on the midrib and 7 or 8 pairs of slightly curved ascending rather short main-nerves; the connecting nerves wide and transverse; length 5 to 7 in.; breadth 2 to 3 in.; petiole .25 to .5 in. long, deciduously villous; stipules free, lanceolate, with broad bases and long linear apices, pilose, .15 to .2 in. long. *Cymes* terminal, lax, longer than the leaves, spreading, much branched, umbellately many-flowered; the branches minutely pubescent, the bracts at their divisions short and cup-like, those near the base of the flowers much longer (.1 to .2 in.) oblong, free. *Calyx* .15 to .3 in. long, sparsely pilose; the tube sub-cylindric shorter than the 5 narrowly lanceolate acuminate spreading teeth, one of the lobes occasionally petaloid and larger than the leaves, elliptic to elliptic-rotund, shortly apiculate, much narrowed to the long hairy petiole, puberulous on both surfaces, pubescent on the 5 radiating nerves. *Corolla* about three times as long as the calyx, its tube narrowly cylindric, slightly widened in its upper third and minutely strigose; the limb .25 in. across (when dry); its lobes broad, sub-acute. *Fruit* (unripe) cylindric, sub-clavate, crowned by the scars of the deciduous calyx-lobes.

PERAK; *King's Collector* 731, 855, 1910, 3276, 10345.—DISTRIB. Bali, *Teysmann*.

Imperfectly known species.

10. *MUSSAENDA MEMBRANACEA*, King n. sp. A climber; young branches thinner than a goose-quill, angled, dark-coloured, glabrous. *Leaves* membranous, broadly elliptic, sometimes slightly obovate, the apex shortly, broadly, and abruptly acuminate, the base gradually narrowed; both surfaces glabrous; main-nerves 5 to 7 pairs, little-curved, faint, spreading; length 2.75 to 4 in.; breadth 1.5 to 2 in.; petiole .6 to .8 in., stipules united to form a short glabrous cap. *Cymes* solitary, on a peduncle longer than the leaves, few-flowered, dichotomous, spreading, sub-glabrous, the bracts minute, subulate.

SINGAPORE: *Ridley* 1639.

This is only known by leaf-specimens. It is a very distinct species differing in form and texture of its leaves from any other *Mussaenda* in the Provinces. Its nearest ally seems to be *M. glabra*, Wall., and it much resembles a Tonquin species (hitherto unnamed) collected by Balansa (Herb. 624).

19. *TRISCIADIA*, Hook. fil.

A glabrous woody climber. *Leaves* coriaceous, few-nerved; stipules short, broad, connate below, 2-toothed, caducous, leaving an annular

scar. *Flowers* in panicle or ternate compound terminal umbels; bracts and bracteoles 0 (or if any caducous). *Calyx-tube* campanulate; limb coriaceous, tubular, minutely 5-toothed, ciliate, deciduous. *Corolla* coriaceous, salver-shaped; its tube short, glabrous everywhere; lobes of the limb as long as the tube, narrowly oblong, blunt, reflexed valvate in bud, their tips incurved. *Anthers* 5, linear, dorsifixed by short filaments on the throat of the corolla, versatile, exserted. *Ovary* 2-celled; style filiform; stigmas 2, linear-lanceolate; ovules 2 or more in each cell sunk in a fleshy placenta adnate to the septum. *Fruit* large, baccate, globular with leathery pericarp; seeds large compressed.—DISTRIB. A single Malayan species.

TRISCIADIA TRUNCATA, Hook. fl. in Benth. & Hook. fl. Gen. Plantar. II. 69. Young branches thinner than a goose-quill, pale-brown when dry. *Leaves* broadly elliptic to sub-rotund, obtuse or bluntly cuspidate, both surfaces olivaceous-brown when dry, the upper shining; the lower paler, dull; main-nerves 4 to 6 pairs, slightly curved, ascending, prominent on the lower surface; length 2.5 to 4 in.; petioles .3 to .5 in., stipules forming a tube only .1 in. deep. *Umbels* 2.5 to 4 in. long, and about as much across. *Flowers* .5 in. long, their pedicels about .1 in. long. *Calyx* .1 in. long, truncate, the limb minutely toothed. *Corolla* .4 in. long, coriaceous, tubular, slightly expanded at the mouth and divided into 5 narrowly oblong, blunt, reflexed lobes about as long as the tube. *Fruit* globular, crowned by the large flat calyx-scar, about 1 in. in diam. *Webera truncata*, Roxb. Fl. Ind. ed. Carey and Wall. II. 538. *Stylocoryne truncata*, Wall. Cat. 8403. *Gupia truncata*, DC. Prod. IV. 394. *Pseudizora truncata*, Miq. Fl. Ind. Bat. II. 210.

PENANG: Wallich. PERAK: Wray 2104, 3271; Scortechini; Ridley 8374; King's Collector 5508, 6431, 6545.—DISTRIB. Andaman Islands; Sumatra; Java, Forbes 2504.

20. AULACODISCUS, Hook. fl.

Small glabrous trees. *Leaves* coriaceous; the stipules narrowly triangular, long-acuminate, caducous. *Flowers* small, polygamous, in axillary pedunculate many-flowered paniculate or umbellate cymes. *Calyx-tube* broadly hemispheric; the limb short and truncate-sinuate. *Corolla* coriaceous, rotate, the throat hairy; the limb with triangular-lanceolate, valvate, incurved lobes. *Stamens* 8 or 16, the alternate row imperfect; filaments flexuous; *anthers* dorsifixed, small, didymous. *Disk* large and prominent, 8- to 16-lobed. *Ovary* 6- to 16-celled; *ovules* numerous, on prominent placentas in the inner angles of the cells. *Berry* small, globose, areolate at the apex, usually 8- to 16-celled. *Seeds* numerous, minute, sub-globose; the testa thick, crustaceous, pitted;

embryo pyriform, in fleshy albumen.—DISTRIB. Two species, both Malayan.

A genus closely allied to *Urophyllum*.

Flowers in long-peduncled cymes with leafy bracts at the bases of branches; calyx a shallow cup; leaves acute 1. *A. premnoides*.

Flowers in shortly peduncled panicles without leafy bracts; calyx a deep cup; leaves acuminate ... 2. *A. Maingayi*.

1. *AULACODISCUS PREMNOIDES*, Hook. fil. in Gen. Plantar. II. 71. Young branches dark-coloured, 4-angled, glabrous. Leaves thinly coriaceous, oblong, shortly acuminate, the base slightly narrowed, both surfaces olivaceous-brown when dry, glabrous; the upper shining, the lower paler, dull and transversely reticulate; main-nerves 14 to 16 pairs, spreading to slightly curved; length 5·5 to 7 in.; breadth 1·25 to 1·65 in.; petiole 2 to 3·5 in. Cymes about 1·25 in. long and 1·5 in. in diam., pedunculate, axillary, trichotomously umbellate, rusty-puberulous; the common peduncle 1 in. long, the secondary half as long, each bearing at its base a leafy ovate-rotund petiolate bract 3 to 4 in. long. Flowers about 1 in. long, their pedicels longer. Calyx shallow, cupular, indistinctly toothed. Corolla much depressed in bud, the mouth with 8 inflexed lobes, hairy outside. Perfect stamens 8, included, broadly ovate, on short filaments. Disc large, convex, hairy, deeply 8-grooved. Hook. fil. Fl. Br. Ind. III. 97 in part. *Axanthus enneandra*, Wight in Calc. Journ. Nat. Hist. VIII. 144.

MALACCA: Griffith (K.D.) 2938.

2. *AULACODISCUS MAINGAYI*, King & Gamble n. sp. A tree; young branches as thick as a goose- or swan-quill, dark-coloured, obtusely 4-angled. Leaves thinly coriaceous, pale-brown when dry, oblong or oblong-elliptic, acute, slightly narrowed at the base; both surfaces shining, olivaceous-brown, the lower slightly paler; main-nerves 12 to 14 pairs, curved, spreading, thin but prominent beneath; length 6 to 8 in.; breadth 2 to 2·5 in.; petiole 2·5 to 5 in. Panicles pedunculate, cymose, with no leafy bracts at the bases of the branches, many-flowered, 1 to 1·5 in. in diam., slightly puberulous and with a few small bracteoles, the peduncles less than 5 in. long. Flowers 1 in. long, their pedicels longer. Calyx deeply cupular; sub-glabrous; its mouth truncate, entire. Corolla twice as long as the calyx, with 8 deep lanceolate reflexed lobes. Style long, reflexed over the disc.; stigma large. Fruit 2·5 in. in diam. *Aulacodiscus premnoides*, Hook. fil. in Fl. Br. Ind. III. 97 in part.

MALACCA: Maingay (K.D.) 938. SELANGOR: Curtis 2343. PERAK: Scortechini 2004; King's Collector 1086.—DISTRIB. Sumatra.

This is one of the two plants referred to *A. premnoides* by Sir Joseph Hooker in F.B.I. l.c. It appears to us to differ sufficiently from the other of Griffith K.D.

2938) to deserve specific rank. It agrees with a Sumatra plant in Herb. Calcutta bearing the MSS. name *A. peltastigma*, Miq. But we can find no description of the species.

21. UROPHYLLUM, Wall.

Small trees or shrubs with terete slender branches. *Leaves* petiolate, usually elongate and acuminate. *Stipules* elongate small, rarely large. *Flowers* small (sometimes unisexual) in small axillary, sessile or pedunculate cymes or fascicles; their pedicels usually short, bracteolate at the base. *Calyx-tube* short, sub-globose or obconic, the limb cupular, persistent, usually 5-lobed (rarely 4- to 7-lobed). *Corolla* coriaceous, with a short tube and villous throat; the limb with 5 (rarely 4 to 7) erect or spreading triangular valvate lobes. *Stamens* 5 (rarely 4 to 7), inserted by short filaments in the throat. *Anthers* linear, acute, dorsifixed. *Disc* tumid, sulcate. *Ovary* 5 (rarely 4- to 7-celled); *style* short, often tumid at the base; *stigma* ovoid or clavate entire or notched. *Ovules* numerous, on axillary placentas. *Fruit* a small 4- to 5-celled many-seeded berry. *Seeds* minute, sub-globose; the testa pitted, crustaceous; the embryo clavate, in fleshy albumen.—**DISTRIB.** about 35 species; tropical Asiatic and African and one in Japan.

Leaves more or less hairy :—

The whole of the under surface of the leaves more or less pubescent :—

Leaves elliptic-oblong, 6 to 10 in. long :—

Cymes with large permanent bracts ... 1. *U. villosum*.

Cymes ebracteate or with small deciduous bracts ... 2. *U. macrophyllum*.

Leaves oblong-lanceolate, 2.5 to 5 in. long :—

Pubescence of leaves, young branches and fruit cinereous ... 3. *U. hirsutum*.

Pubescence of leaves and young branches warm-ferrugineous, fruit glabrous ... 4. *U. ferrugineum*.

Under surfaces of the leaves pubescent only on the midrib and nerves :—

Leaves 8 to 10 in. long :—

Flowers on bracteolate peduncles, trichotomously umbellate cymes several inches across ... 2. *U. macrophyllum*,
var. *corymbosa*.

Leaves 3 to 5 in. long :—

Flowers in dense many in few-flowered showy pedunculate umbels; fruit sparingly hairy, pedunculate umbels; bullate ... or sub-glabrous; leaves not

Leaves everywhere glabrous ... 5. *U. streptopodium*.

Flowers 5-merous :—

Umbels simple; fls

... pedicels :— ... pedicels glabrous, on slender pedi-

Umbels 10- to 1

- minate, shining when dry, the main-nerves very prominent ... 6. *U. glabrum*.
 Umbels 4- to 6-flowered; leaves shortly acuminate, dull when dry; nerves not prominent ... 5. *U. streptopodium*.

Flowers 4-merous:—

- Umbels compound, trichotomous; flowers pedicelled, with hirsute permanent bracteoles; corolla puberulous outside, hirsute inside ... 7. *U. trifurcum*.
 Cymes 8- to 10-flowered; flowers sessile puberulous ... 8. *U. potatorum*.

1. *UROPHYLLUM VILLOSUM*, Jack & Wall. in Roxb. Fl. Ind. ed. Carey & Wall. II. 185. A shrub to 10 feet high; young branches nearly as thick as a goose-quill, covered with adpressed yellowish hair. *Leaves* coriaceous, pale, yellowish-green when dry, oblong-elliptic, caudate-acuminate, the base slightly narrowed or rounded; upper surface glabrous; the lower boldly reticulate and bearing many pale subadpressed hairs especially on the nerves and veins; midrib prominent, tomentose; main-nerves 10 or 11 pairs, much curved, ascending; bold on the lower surface; length 7 to 10 in.; breadth 2.75 to 3.25 in.; petiole .3 in., tomentose. *Stipules* narrowly oblong-lanceolate, blunt, tomentose below, .8 in. long. *Cymes* .4 to .8 in. long, on pedicels of the same length, about .8 in. in diam., condensed; bracts numerous, narrowly oblong, blunt, pilose, persistent. *Flowers* densely crowded, their pedicels short, pubescent. *Calyx* campanulate, .25 in. long, with 5 triangular blunt spreading lobes, pubescent on both surfaces. *Corolla* longer than the calyx, cylindric-campanulate, thick, deeply divided into 5 oblong concave lobes, the throat densely pilose; *stamens* linear, glabrous. *Fruit* sub-globular, truncate at the apex and crowned by the short triangular calyx-teeth, sparsely villous, 3 in. in diam. when dry. Wall. Cat. 8314; DC. Prod. IV. 441; Hook. fil. Fl. Br. Ind. III. 99.

PENANG: Wallich; King; Maingay (K.D.) 884; Curtis 178, 7201.
 PERAK: Wray 2634; Scortechini 1983; King's Collector 526, 2563; Ridley 9711. SINGAPORE: Lobb 322.

2. *UROPHYLLUM MACROPHYLLUM*, Korth. Young branches slender obtusely 4-angled, at first densely and minutely pubescent, sometimes becoming ultimately almost glabrous. *Leaves* membranous, elliptic-oblong, sometimes obovate-elliptic, shortly and rather abruptly acuminate, the base cuneate; upper surface olivaceous-green when dry, glabrous except the depressed-pubescent midrib; the lower pale-olivaceous, the midrib and 9 to 11 pairs of curved ascending main-nerves prominent and pale pubescent, the interspaces and rather distinct transverse veins also pubescent; length 6 to 10 in.; breadth 1.75 to 3 in.; petiole .4 to .6 in.; stipules lanceolate, adpressed-pubescent, .4 to .6 in. long

Cymes 8- to 10-flowered, ebracteate or bracts small and fugacious, when in flower not much exceeding the petioles in length; the peduncles much shorter (longer in var. *corymbosa*) than the pubescent pedicels. *Flowers* .15 in. long, their pedicels .3 to .4 in. long. *Calyx* a shallow truncate adpressed-hairy cup, its mouth with 5 short triangular teeth. *Corolla* longer than the calyx, glabrous. *Fruit* globular, glabrescent, crowned by the calyx-lobes, .15 in. in diam. Koord. & Valet. Bijdr. 8, 68. *Axanthus longifolia*, Wight in Calc. Journ. Nat. Hist. VII. 145 t. 2, f. 1. *U. strigosum*, Kurz Fl. Burm. II. 53 (not of Korthals). *U. longifolium*, Hook. fil. Fl. Br. Ind. III. 99.

PENANG: *Curtis* 2753. SELANGOR: *Ridley* 7440, 8576. PERAK: *Wray* 2201, 3511; *Scortechini* 267, 715; *King's Collector* 2838, 2948, 2964.

VAR. *corymbosa*; cymes 1 or 2 in the axils of the leaves, often as much as 3.5 in. long (including the long peduncle), trichotomously corymbose; stipules longer than the petioles, broadly oblong lanceolate, sometimes auricled at the base, pubescent. *Urophyllum corymbosum*, Korth. Ned. Kruidk. Arch. II. 194; Koord. & Valet. Bijdr. 8, 73.

PERAK: *Scortechini*. *King's Collector*, 2263, 2298, 2409, 5723. JOHOR: *King*.—DISTRIB. Sumatra, Java.

3. *UROPHYLLUM HIRSUTUM*, Hook. fil. Fl. Br. Ind., II. 98. Young branches slender, softly cinereous-tomentose like the stipules, petioles, and inflorescence. *Leaves* membranous, oblong-lanceolate or narrowly elliptic, acuminate, the base rounded or sometimes narrowed; upper surface glabrous, rarely sub-glabrous; the lower with pale soft spreading hairs especially on the midrib and nerves; main-nerves 8 to 10 pairs, curved, ascending; length 3 to 5 in.; breadth 1 to 2 in.; petiole .15 to .25 in.; *stipules* much longer than the petioles, linear-lanceolate. *Cymes* small, capitate, sessile, few-flowered, with a few ovate-lanceolate bracts. *Calyx* hairy, on a short stalk; the tube very short; the limb with 5 broad triangular spreading lobes. *Corolla* hairy. *Fruit* depressed-globose, the apex truncate, crowned by the small remains of the calyx, sparsely pubescent, .15 to .2 in. in diam. when dry. *Axanthus hirsuta*, Wight in Calc. Journ. Nat. Hist. VII. 148. *Wendlandia bifaria*, Wall. Cat. 6278.

MALACCA: *Maingay* (K.D.) 873; *Griffith* (K.D.) 2939; *Wallich*, *Goodenough*. PENANG: *Ridley* 10251. SELANGOR: *Ridley* 7442. NEGRI SEMBILAN: *Ridley* 10100. SINGAPORE: *Ridley* 3906, 4913, 8428. JOHOR: *Ridley* 4912, 11173, 11174. PERAK: *Scortechini* 84; *Wray* 152, 1305, 2488; *King's Collector* 199, 10494. PAHANG: *Ridley* 2204, 2206.

This species varies considerably as to the amount of hair on the leaves and as to the number of the main-nerves. I refer to it with some hesitation *Ridley* 11176 from Johor, No. 8577 from Selangor, *Scortechini* 267 from Perak.

4. *UROPHYLLUM FERRUGINEUM*, King and Gamble n. sp. A slender small tree. Young stems softy, minutely, and rather sparsely rusty-tomentose. *Leaves* membranous, narrowly oblong-lanceolate, caudate-acuminate, the base slightly narrowed or rounded; upper surface glabrous, the midrib distinct, depressed, the main-nerves faint when dry; lower paler, sparsely rusty-sericeous between the nerves; the main-nerves themselves about 7 pairs, curved, ascending, distinct and, like the midrib, densely rusty-sericeous; length 2.5 to 3.5 in.; breadth .5 to 1 in.; petioles .15 to .4 in., tomentose; stipules more than twice as long as the petioles, narrowly oblong-lanceolate, rusty-sericeous. *Cymes* not much exceeding the petioles, almost sessile, few-flowered, with a few small lanceolate bracts at their bases. *Flowers* on pubescent pedicels equal to or longer than themselves. *Calyx* shortly campanulate, with 5 broad short pointed teeth, almost glabrous. *Corolla* white, glabrous, larger than the calyx, the tube shortly cylindric; the teeth 5, rather large, triangular, acute. *Fruit* depressed globular, truncate at the apex and bearing the small calyx-teeth, glabrous, .2 in. in diam.

PERAK: Ridley 2930, 9736; Curtis 2017; Wray 2065, 3933; King's Collector 780, 4112; Scortechini 205. KEDAH: Ridley.

A species near *U. streptopodium*, Wall., but readily distinguished by its soft silky hair. This is closely allied to a Bornean species collected by Beccari, P.B. 1840, and by Ridley, 2781, which has however longer pedicelled flowers and hairy fruit.

5. *UROPHYLLUM STREPTOPODIUM*, Wall. Cat. 8317; Hook. fil. Fl. Br. Ind. III. 99. A shrub or small tree; young branches less than half as thick as a goose-quill, yellowish-brown, at first minutely adpressed-pubescent, ultimately often glabrous. *Leaves* thinly coriaceous, elliptic-oblong to oblanceolate, shortly acuminate, much narrowed from near the middle to the base, both surfaces greenish-yellow to pale olivaceous-brown when dry, the upper glabrous; the lower paler, transversely reticulate, minutely scaly, glabrous, or finely pubescent on the midrib and 5 to 8 pairs of curved, ascending main-nerves and also sometimes on the transverse veins; length 2.5 to 6 in.; breadth .8 to 2 in.; petioles .25 to .5 in., adpressed-pubescent or glabrous. *Stipules* narrowly oblong-lanceolate, acute or blunt, sparsely adpressed-pubescent or sub-glabrous, slightly longer (some twice as long) as the petioles. *Cymes* axillary, from as long to twice as long as the petioles, many-flowered dense and sessile, or umbellate on short bracteolate peduncles and few-flowered. *Flowers* about .15 in. long, on pubescent pedicels lengthening in fruit to .1 to .2 in. *Calyx* sub-glabrous, cupular-campanulate, the mouth with 5 (occasionally 6) small, more or less acute triangular lobes. *Corolla* one and a half to nearly three times as long as the calyx, campanulate, with 5 deep oblong blunt, sub-erect or reflexed lobes, often hairy on the

inner surface. *Fruit* sub-globular, depressed, the apex truncate and crowned by the minute remains of the calyx, glabrous or sparsely hairy, .1 to .2 in. in diam. *U. parviflorum*, Wall. Cat. 8320; *U. glabrum*, Wall. Cat. 8316 in part. *Urophyllum*, Wall. Cat. 8315? *U. Blumeianum*, Hook. fil. Fl. Br. Ind. III. 99. *U. umbellulatum*, Miq. Fl. Ind. Bat. Suppl. 542; Hook. fil. Fl. Br. Ind. III. *Geniostomum acuminatum*, Wall. in Roxb. Fl. Ind., ed. Carey & Wall. II. 316; Wall. Cat. 9067. *Timonius acuminatus*, Wall. Cat. 6218. *Axanthes Blumeanus*, Wight in Calc. Journ. Nat. Hist. IV. 145.

In all the provinces; a common and variable plant passing into *U. glabrum* and doubtfully distinct therefrom.

6. *UROPHYLLUM GLABRUM*, Wall. in Roxb. Fl. Ind., ed. Carey and Wall. II. 186. A shrub; or small tree 15 to 20 feet high; young branches half as thick as a goose-quill, obtusely 4-angled and grooved, puberulous, becoming glabrous. *Leaves* thinly coriaceous, elliptic, oblong-elliptic, or oblong, shortly acuminate, slightly narrowed or rounded at the base; both surfaces pale yellowish- or olivaceous-brown when dry, glabrous and reticulate, the midrib bold, depressed on the upper surface but prominent on the lower, like the 7 to 12 pairs of curved, spreading, main-nerves; length 4 to 9 in.; breadth 1.5 to 3 in.; petioles .3 to .5 or sometimes 1 in. long, puberulous or glabrous; *stipules* linear-oblong, blunt; adpressed-pubescent, somewhat longer than the petioles. *Umbels* axillary, 10- to 12-flowered, bracteolate, on peduncles varying from .25 to .5 in. or even 1 in. in length, rarely sub-sessile. *Flowers* .15 in. long, on slender pedicels .2 to .3 in. long. *Calyx* widely cupular, truncate or minutely toothed, glabrous. *Corolla* glabrous, longer than the calyx, its mouth with 5 deeply triangular lobes. *Anthems* ovate, surrounded by long hairs. *Fruit* depressed-globular, crowned by the wavy calyx, .2 in. in diam. Wall. Cat. 8316 (excl. B); DC. Prod. IV. 441; Kurz Fl. Burm. II. 53. Hook. fil. Fl. Br. Ind. II. 98. Koord. & Valet Bijdr. 8, 66. *Urophyllum*, Wall. Cat. 8318, 8319, 8322. *U. arboreum*, Korth. in Ned. Krindk. Arch. II. 194. *U. repandulum*, Miq. Fl. Ind. Bat. II. 353. *Axanthes arborea*, Blume Bijdr. 1603. *Wallichia arborea*, Reinw. ex Blume in Flora 1825, 107. *Urophyllum Griffithianum*, Hook. fil. Fl. Br. Ind. III. 98. *Axanthes Griffithiana*, Wight in Calc. Journ. Nat. Hist. VII. 147.

In all the provinces; very common.

7. *UROPHYLLUM TRIFURCUM*, H. H. W. Pearson MSS. Young branches terete, dark-coloured, glabrous, half as thick as a goose-quill. *Leaves* coriaceous, oblong-elliptic, shortly acuminate, the base rounded or slightly narrowed; both surfaces glabrous except the depressed pubescent midrib and nerves on the upper, the lower reticulate, shining; main-

nerves 10 to 12 pairs, curved, spreading, very prominent beneath; length .6 to .8 in.; breadth 2.5 to 3.25 in.; petioles .5 to .75 in. stout. *Flowers* in pedunculate trichotomous axillary compound umbels, the common peduncle 1 to 1.25 in. long, rusty-puberulous; the secondary umbels on short peduncles 6- to 8-flowered, with broadly ovate hirsute deciduous bracteoles at their bases. *Flowers* .25 in. long, on rusty-pubescent pedicels shorter than themselves. *Calyx* cupular; its mouth truncate, undulate. *Corolla* as long as the calyx; its 4 lobes broad, blunt, puberulous outside, hirsute inside. *Fruit* unknown.

JOHOR: *Ridley* 4084, 7441; *Scortechini*. SELANGOR: *Ridley* 7441, 7435, 8540. PAHANG: *Ridley* 11180.

8. *UROPHYLLUM POTATORUM*, King n. sp. A small tree; all parts except the flowers glabrous; young branches thinner than a goose-quill, terete, pale-brown when dry. *Leaves* coriaceous, elliptic-oblong, caudate-acuminate, the base cuneate, both surfaces brown tinged with olivaceous when dry, dull; main-nerves 5 to 9 pairs prominent like the midrib on the lower surface and depressed on the upper, veins faint on both; length 4 to 8 in.; breadth 1.25 to 1.75 in.; petiole .2 to .25 in. stout; *stipules* ovate, much acuminate. *Cymes* axillary, longer than the petioles, 8- to 10-flowered. *Flowers* crowded, puberulous externally. *Calyx* sessile, cylindric, the limb obscurely toothed, .2 in. long. *Corolla* longer than the calyx; the 4 lobes oblong, blunt, reflexed. *Fruit* unknown.

MALACCA: on Mount Ophir. *Hullett* 104; *Wray* 756. PERAK: *King's Collector* 3211.

The flowers in the only three specimens which I have seen are in bad condition, but they appear to be those of *Urophyllum*. According to Mr. Wray's field note, the flower is whitish-green and the fruit is orange or yellow when ripe. The leaves of the plant are used by the Malays to make a decoction which they drink as a beverage that appears to have some of the physiological effects of tea.

NOTE.—In addition to the foregoing species from the Malay Peninsula we take this opportunity of describing the following very distinct species which has hitherto been collected only in the Andaman Islands.

UROPHYLLUM ANDAMANICUM, King & Gamble n. sp. Young branches brown, thinner than a goose-quill, glabrous but for a very few scattered hairs near the nodes. *Leaves* oblanceolate, shortly and rather abruptly acuminate, narrowed from above the middle to the short petiole; upper surface pale olivaceous when dry, glabrous; the lower paler, glabrous, except the rusty adpressed-pilose midrib and nerves, transversely reticulate; main-nerves 10 to 12 pairs, ascending, very slightly curved; length 5 to 7.5 in.; breadth 1.5 to 2.25 in.; petiole .25 to .35 in. *Stipules* lanceolate, much acuminate, densely rusty-pilose on the lower surface. *Cymes* 1 to 3 in a leaf-axile, on slender peduncles much longer than the petioles, densely umbellate, many-flowered, the flowers on coarsely rusty-pubescent pedicels, mostly longer than themselves. *Flowers* .15 in. long. *Calyx* deeply cupular, pubescent outside like the pedicels; the mouth truncate and usually entire, sometimes minutely toothed. *Corolla* twice as long as the calyx, glabrous except the densely pilose

throat; the lobes deep, broadly lanceolate, acute. *Fruit* sub-globular, truncate, the top bearing the wide-cupular calyx-limb, puberulous, .15 in. in diam.

ANDAMAN ISLANDS : *King, Prain.*

22. ADENOSACME, Wall.

Shrubs with terete brittle branches. *Leaves* membranous, with many pinnate nerves; *stipules* lanceolate, sometimes toothed. *Flowers* in axillary or terminal paniculate, spreading cymes, bracts often glandular. *Calyx-tube* globose or hemispheric, with 4 to 6 persistent lobes. *Corolla* tubular; its lobes 4 to 6, triangular or oblong, valvate in bud, their edges everted. *Stamens* 4 to 6, inserted by short filaments on the tube. *Ovary* 2- or 5-6-celled; *style* slender or thickened above; *stigmas* 2 or 5-6, linear; *ovules* very numerous, on fleshy peltate placentas. *Fruit* a globose berry, with coriaceous or fleshy epicarp, crowned by the remains of the calyx, 2- to 5-6-celled, indehiscent or dehiscing loculicidally at the apex; seeds many on sub-globose placentas. *Seeds* small, angled, dotted; embryo minute in fleshy albumen.—*DISTRIB.* Species about 6; Indian and Malayan.

Flowers .15 in. long, numerous, in much-branched

paniculate cymes 2 to 6 in. long ... 1. *A. longifolia.*

Flowers .6 in. long, few, in small pedunculate cymes

not exceeding 1 inch in length ... 2. *A. Scortechinii.*

1. ADENOSACME LONGIFOLIA, Wall. Cat. 6280. Two or three feet high; stems as thick as a goose- or swan-quill, straw-coloured, shining, glabrous. *Leaves* elliptic-lanceolate, elliptic-oblanccolate or elliptic, apex rather shortly acuminate, the base much narrowed from above or below the middle to the usually elongate petiole, upper surface dark olivaceous when dry, glabrous, puberulous or pubescent; lower surface always paler and usually more pubescent than the upper; main-nerves 10 to 24 pairs, curved, spreading, thin but distinct on both surfaces; length 6 to 12 in.; breadth 1.5 to 4.5. *Stipules* oblong, blunt, about .3 in. long. *Cymes* paniculate, from 2 to 6 in. across, never more than half as long as the leaves and usually much shorter, solitary, many-flowered, branching from the base or on short peduncles, the branches slender, angled, glabrous or puberulous, the smaller ones zig-zagged and very thin. *Flowers* .15 in. long, shorter than their pedicels, solitary or in fascicles of 2 or 3. *Calyx* almost globular, sparsely pubescent outside; the 5 or 6 lobes spreading, their edges with a few thick elongate glands. *Corolla* not much exceeding the calyx, densely hirsute outside, glabrous inside; the lobes erect, oblong, blunt. *Stamens* subsessile. *Capsule* turbinate, transversely elongated, .2 in. in diam., faintly 2-lobed, with many vertical lines, the epicarp brittle, sub-glabrous, pure white. Miq. Fl. Ind. Bat.

II. 217; Kurz For. Fl. Burm. II. 160; Hook. fl. Fl. Br. Ind. III. 95. *A. Malayana*, Wall. Cat. 6282. *Bertiera javanica*, and *B. fasciculata*, Blume Bijdr. 987; DC. Prod. IV. 392. *Mycetia javanica*, Reinw. *Rondeletia longifolia*, Wall. in Roxb. Fl. Ind. ed. Carey and Wall. II. 137; Don Prodr. Fl. Nep. 138. *Wendlandia longifolia*, DC. l.c. 412. *W. Malayana*, G. Don Gen. Syst. III. 519.

In all the provinces, more or less common.

Varying considerably as to the length of the leaves and petioles and as to the breadth of the former. The flowers are 2- or 3-morphic in the matter of style and stamens.

2. *ADENOSACME SCORTECHINII*, King & Gamble n. sp. A shrub 6 to 8 feet high; branches as thick as the little finger, the youngest much thinner; bark corky, at first pubescent and brown, but afterwards exfoliating, and very pale and deeply grooved. *Leaves* obovate-elliptic or broadly oblanceolate, shortly and abruptly acuminate, much narrowed to the base; upper surface brown and glabrous, the lower paler, puberulous on the midrib, main-nerves and rather distinct transverse veins; main-nerves 16 to 18 pairs, sub-horizontal, prominent beneath; length 8 to 13 in.; breadth 3 to 5 in.; petiole .5 to 1.25 in., pubescent; *stipules* shorter than the petioles, triangular, acute. *Cymes* several from the axils of fallen leaves, under 1 in. in length including the short peduncle, minutely rusty-tomentose, with a pair of lanceolate bracts .15 in. long at the apex of the peduncle and a few minute bracteoles on the branchlets. *Flowers* about .6 in. long. *Calyx* campanulate, .15 in. long; the teeth 5, narrowly lanceolate, longer than the tube. *Corolla* four times as long as the calyx, tubular, inflated at the base and contracted below the limb; lobes of limb 5, lanceolate. *Anthers* 5, sessile at the base of the tube, linear, acute. *Style* shorter than the corolla-tube, filiform, divided into 5 linear puberulous stigmatic arms; *ovary* 2-celled, with numerous ovules from 2 placentas attached to the septum. *Capsule* unknown.

PERAK: *Scortechini*; King's Collector 2223; Wray 1474. SELANGOR: Ridley 7400.

23. *BRACHYTOME*, Hook. fl.

Glabrous shrubs with petiolate membranous leaves; *stipules* triangular, acuminate, persistent. *Flowers* small, polygamo-dioecious, in small slender cymose panicles from the axils of undeveloped leaves, bracts minute. *Calyx* with an ovoid or oblong tube (short in the male) and a cupular, 5-toothed persistent limb. *Corolla* glabrous, widely funnel-shaped, the limb with 5 short lobes, twisted in bud. *Anthers* sub-sessile on the throat of the corolla, included, linear-oblong, imperfect in the female flowers. *Disc* small and annular in the male

flower; cupular and larger in the female. *Ovary* 2-celled; *style* filiform (short in the male); *stigmas* 2, short, oblong, obtuse, grooved; *ovules* very numerous, borne on the surface of peltate tumid placentas. *Berry* small, globular or ovoid, 2-celled, many-seeded. *Seeds* cuneate, compressed, with thin reticulate testa, and fleshy albumen; embryo small, sub-cylindric.—*DISTRIB.* Two species; one Eastern Himalaya and one Malayan.

BRACHYTOME SCORTECHINII, King & Gamble n. sp. A shrub 6 to 12 feet high; young branches twice as thick as a crow-quill, somewhat compressed. *Leaves* thinly membranous, narrowly elliptic, tapering about equally to each end, the apex acuminate, both surfaces pale olivaceous when dry, the lower tinged with brown; main-nerves 10 to 14 pairs, spreading, curving slightly upwards, prominent on the lower surface; length 4 to 8 in.; breadth 1.5 to 2.5 in.; petiole .2 to .25 in.; *stipules* shorter than the petioles, broadly triangular, keeled, acuminate. *Cymes* 1 to 1.5 in. long, with few, spreading, lax branches. *Flowers* .35 in. long. *Calyx* about the same length as the corolla; its tube ovoid, constricted below the short, obscurely 5-toothed limb. *Berry* globular, .3 in. in diam., smooth, crowned by the short calyx-limb.

PERAK: at elevations of 3,000 to 4,000 feet; *Scortechinii* 14, 237, 1215; *King's Collector* 2136, 2930; *Wray* 950, 2812, 2999.

This resembles *B. Wallichii*, Hook. fil., the only other species of the genus as yet described; but that has leaves of thicker texture, more numerous flowers, and ellipsoid fruit.

24. *STYLOCORYNA*, Cav.

Trees or shrubs, with pubescent or glabrous usually membranous leaves and ovate-triangular, usually deciduous stipules. *Flowers* in terminal corymbose bracteolate cymes, 5-merous. *Calyx-tube* ovoid or campanulate; the limb short or long, always 5-cleft. *Corolla* funnel-shaped, its tube varying in length, the throat glabrous; the limb 5-lobed, narrow, reflexed or spreading. *Stamens* 5, on the mouth of the corolla, sessile or on short filaments; the *anthers* narrow, exserted. *Ovary* 2-celled; *style* stout; *stigma* long, usually thicker than the style; fusiform or clavate; *ovules* numerous, rarely 2 in each cell, often immersed in the peltate placentas. *Fruit* globose, baccate, without pulp, 2-celled; cells 2- or many-seeded. *Seeds* angled; albumen fleshy or horny; embryo small; cotyledons small, leafy.—*DISTRIB.* Probably about 15 species; tropical Asiatic.

The above definition is limited so as to include only the pentamerous many-seeded species which in Hooker's Flora of British India are included in the genus *Webera* of Schreber (founded in 1791). Some recent authors refer these species to *Tarenna* a genus established by Gaertner in 1788 for *T. Zeylanica* (Gaertner, Fruct.

I. 139, t. 28). Gaertner however, defines and figures *Tarenna* as tetramerous. We therefore for these pentamerous species revive the genus *Stylocoryna* (established in 1797 by Cavanilles; Cav. *Ic.* IV. 46, t. 368) which that author describes as pentamerous and many-seeded. For the genus *Webera* of Schreber we reserve in the present work certain tetramerous uni-ovulate plants which in external characters resemble *Ixora* and *Pavetta*. In Engler's *Pflanzen-familien* *Webera*, Schreb., is reduced to *Chomelia*, a genus founded by Linnaeus in 1737. This name *Webera* was subsequently adopted by two botanists, Jacquin and Velloso, for two distinct genera. There is thus much confusion connected with it.

Leaves much longer than broad, tapering about equally to apex and base; cymes contracted :—

Main nerves of leaves faint on both surfaces :—

Leaves oblong-lanceolate quite glabrous; calyx puberulous, its lobes long, linear ... 1. *S. angustifolia*.

Leaves narrowly elliptic-oblong; lower surfaces minutely adpressed-hairy; the upper glabrous except the midrib; calyx pubescent, its lobes very short, acute ... 2. *S. adpressa*.

Main nerves prominent on the lower surface :—

Leaves hispid on the upper surface, softly pubescent on the lower; calyx densely covered with long stiff pale hairs; its lobes long, linear... 3. *S. Maingayi*.

Leaves about twice (rarely three times) as long as broad; cymes spreading; main-nerves 10 to 12 (rarely so few as 6) pairs, bold and prominent on the lower surface :—

Leaves obovate, glabrous except for tufts of hair in the nerve axils beneath ... 4. *S. costata*.

Leaves elliptic-oblong to elliptic-lanceolate or elliptic :—

Both surfaces of the leaves glabrous except for a few hairs on the midrib ... 5. *S. fragrans*.

Upper surface of the leaves hispidulous, the lower softly pubescent ... 6. *S. mollis*.

1. *STYLOCORYNA ANGUSTIFOLIA*, King n. sp. A shrub 4 to 6 feet high, glabrous except the inflorescence; young branches striate, thinner than a goose-quill. *Leaves* coriaceous, narrowly oblong-oblancoelate, much but rather bluntly acuminate, gradually narrowed from the middle to the petiole, the edges (when dry) much recurved; both surfaces blackish when dry, shining, the midrib deeply depressed on the upper, bold and prominent on the lower surface; main-nerves 5 or 6 pairs, oblique, ascending, indistinct on both surfaces; length 2.5 to 3.5 in.; breadth .75 to 1 in.; petiole .2 to .35 in. *Stipules* broad, transversely oblong, abruptly acuminate, .25 in. long. *Cymes* less than 1 in. in diam., solitary, terminal, shortly pedunculate, not (even including the peduncles) half so long as the leaves, the branches few, ascending, compressed, puberulous with lanceolate spreading bracteoles; 3- to 5-flowered.

Flowers .35 in. long, puberulous externally, on short pedicels bracteolate at the base. *Calyx* puberulous, campanulate, with short tube and 5 long narrowly linear-lanceolate spreading lobes. *Corolla* not much exceeding the calyx, with a short tube and 5 imbricate oblong acute lobes united only at the sericeous bases, minutely pubescent on the outer surface, glaberrulous on the inner. *Anthers* 5, linear, united into a tube round the long cylindric style, the filaments free, dorsifixed. *Ovary* sunk in the calyx tube and attached to it, 2-celled, the placentas infolded, several seeded. *Fruit* un nown.

PERAK: *King's Collector* 8265. Only once collected. A very distinct species.

2. *STYLOCORYNA ADPRESSA*, King n. sp. A shrub; young branches thinner than a goose-quill, obtusely 4-angled, covered with short rusty deciduous tomentum. *Leaves* thinly coriaceous, narrowly elliptic-oblong, often slightly oblanceolate, shortly and sharply acuminate, the base much narrowed; both surfaces dark olivaceous when dry, the upper glabrous and minutely reticulate; lower surface and especially the midrib with short sparse stiff adpressed pale hairs; main-nerves 6 to 10 pairs, curved, spreading, faint on the upper surface, distinct on the lower; the midrib stout, channelled above; length 4 to 8 in.; breadth .75 to 1.75 in.; petioles .25 to .4 in. *Stipules* ovate, acute, .15 in. long, deciduous. *Cymes* solitary, terminal, about 1 in. long (including the short peduncle), dichotomous, few-flowered; the branches divergent, densely tomentose. *Flower*-pedicels short, bi-bracteolate at the base. *Flower* about .6 in. long. *Calyx* urceolate .1 in. long, with 5 short acute teeth. *Corolla*-tube .35 in. long, minutely pubescent without like the calyx, twice as long as the oblong, blunt lobes of the limb. *Anthers* linear, subsessile. *Fruit* pisiform, the apex with the small scar of the calyx, glabrous; seeds two in each cell, many-angled.

In all the provinces; common.

VAR. *papillulosa*. *Leaves* 3.5 to 4 in. long, coriaceous, lower surface with numerous minute dark-brown papillæ, the pubescence rusty.

SINGAPORE: *Ridley* 3885, 4960. JOHOR: *Ridley* 2879. PAHANG: *Ridley* 1087.

The only specimens of this which I have as yet seen are rather imperfect. It is quite possible that it will have to be treated as a species when fuller material is obtained.

3. *STYLOCORYNA MAINGAYI*, King. A shrub; young branches thinner than a goose-quill, densely tawny or rusty-tomentose. *Leaves* thickly membranous, elliptic-lanceolate to elliptic-ovate, shortly caudate-acuminate, the base cuneate; upper surface sparsely hispid-pubescent; the lower softly pubescent; main-nerves 8 or 9 pairs, spreading, curved,

depressed like the midrib on the upper surface when dry and prominent, on the lower; length 3 to 6.5 in.; breadth 1.5 to 3 in.; petiole .25 to .35 in. *Stipules* lanceolate with long filiformly acuminate apices, rusty-pubescent, .5 in. long. *Cymes* in condensed sub-globular panicles 1.5 to 3 in. in diam.; the branches short, covered like the calyces externally with long pale soft hairs and bearing many long filiform pubescent bracteoles. *Flowers* .7 in. long (excluding the style) on slender short pedicels. *Calyx* flask-shaped, .15 in. long, the mouth with 5 long linear, recurved stiffly pubescent lobes. *Corolla* with cylindric pubescent tube more than twice as long as the blunt oblong lobes of the limb. *Ovary* 2-celled, each cell with several triangular ovules, disk thick cushion like. *Fruit* the size of a large pea, glabrous, the calyx-scar small. *Seeds* several, angled. *Webera Maingayi*, Hook. fl. Fl. Br. Ind. III. 103.

MALACCA: *Griffith* (K.D.) 3081; *Maingay* (K.D.) 932; *Ridley* 323. PERAK: *King's Collector* 1021, 2526, 4610, 5902, 10754. NEGRI SEMBILAN: *Ridley* 10102. JOHOR: *Ridley* 11169.

Resembling *Pavetta naucleiflora*, Wall., in externals, and varying somewhat as to the amount of the pubescence. *Griffith* No. 3082 (K.D.) seems to be a form of this with the upper surfaces of the leaves almost glabrous and the lower with minute scanty pubescence.

4. *STYLOCORYNA COSTATA*, Miq. Fl. Ind. Bat. Suppl. 218. A tree; young branches as thick as a goose-quill, bluntly 4-angled, rusty-pubescent. *Leaves* thickly membranous, obovate, the apex broad, obtuse, or with an abrupt small apiculus, the base much narrowed; upper surface dark-brown and shining when dry, glabrous; the lower paler, dull, glabrous except for tufts of coarse rusty hair in the axils of the 10 to 12 bold spreading slightly curved main-nerves; length 6 to 8 in.; breadth 3.5 to 4.5 in.; petiole .6 to .8 in.; stipules of the stem-leaves not seen, those at the base of the cyme short, broad, blunt. *Cymes* crowded at the apices of the branches, each individual pedunculate, corymbose, densely many-flowered, everywhere minutely and densely pubescent like the flowers and their pedicels, 1 to 1.5 in. in diam., bracteoles minute. *Flowers* .65 in. long; the calyx about .15 in. long, campanulate, bluntly 5-lobed. *Corolla-tube* narrowly cylindric, twice as long as the blunt oblong lobes of the limb. *Fruit* the size of a small pea, glabrous, many-seeded. *Webera costata*, Hook. fl. in Fl. Br. Ind. III. 103.

MALACCA: *Griffith* (K.D.) 2791; *Maingay* (K.D.) 945. SELANGOR: *Curtis* 2345.—DISTRIB. Sumatra.

Closely allied to *S. fragrans*, but arboreous and with obovate leaves.

5. *STYLOCORYNA FRAGRANS*, Blume Bijdr. 982. A shrub or small tree; young branches 4-angled, sparsely and deciduously strigose, thinner than a goose-quill. *Leaves* thinly coriaceous, elliptic (often narrowly so),

elliptic-oblong, or oblanceolate, acute or shortly acuminate, the base cuneate; both surfaces olivaceous-brown when dry, (the lower paler), glabrous except for a few stout hairs on the midrib and sometimes also on the 6 to 12 pairs of curved ascending slightly prominent main-nerves; length 3 to 7 in.; breadth 1.25 to 2.5 in.; petiole .2 to .5 in.; stipules ovate-lanceolate, acuminate, shorter than the petioles, deciduous; those of the inflorescence permanent, the uppermost often linear. *Cymes* terminal, corymbose, many-flowered, shortly pedunculate, 2 to 4 in. in diam., often several together, the short branches, flower-pedicels, and calyces hispidulous, puberulous, or sub-glabrous. *Flowers* 1 in. long. *Calyx* campanulate-urceolate, only .15 in. long; its lobes sub-erect, oblong, blunt. *Corolla* densely adpressed-pubescent outside; the tube cylindric, .7 in. long, the limb clavate in bud, its 5 lobes short, oblong or sub-spathulate, blunt, .2 in. long. *Style* much exserted. *Fruit* pisiform, glabrous, the scar of the calyx small. DC. Prod. IV. 377. *S. laxiflora*, Blume Bijdr. 983; DC. Prod. IV. 377. *S. lucida*, Miq. Fl. Ind. Bat. Suppl. 541. *Rondeletia lucida*, Wall. Cat. 8453. *Ceriscus fragrans*, Nees in Flora, 1825, 116. *Wahlenbergia fragrans*, Blume Cat. Hort. Bot. Brit. 13. *Webera fragrans*, Hook. fil. Fl. Br. Ind. III. 103. *Tarenna fragrans*, Koord. & Valet. Bijdr. 8, p. 77.

: In all the provinces; common.—DISTRIB. Malay Archipelago.

6. *STYLOCORYNA MOLLIS*, Wall. Cat. 8454. A small tree; young branches thinner than a goose-quill, 4-angled, rusty pilose. *Leaves* thickly membranous, oblong-oblanceolate or oblong-obovate, or elliptic, acute or shortly acuminate, much narrowed at the base; upper surface dark-brown when dry, sparsely and minutely hispidulous; lower surface paler brown rusty- or tawny-pubescent especially on the midrib and 10 to 12 pairs of stout curved spreading main-nerves; length 4.5 to 6.5 in.; breadth 1.75 to 2.75, petioles .3 to .5 in.; stipules ovate-lanceolate, acuminate hooked, about as long as or longer than the petioles, deciduous, those of the inflorescence larger (.75 in. long) and persistent. *Cymes* terminal, corymbose, pedunculate, shorter than the leaves, many-flowered, spreading, 1.5 to 3 in. in diam., sometimes in fascicles of 2 or 3; branches, flower-pedicels and calyces rusty-hispid. *Flowers* .5 or .6 in. long (excluding the style). *Calyx* .1 in. long, campanulate, the limb with 5 broad oblong blunt lobes as long as the tube. *Corolla* cylindric, slightly tapering to the base, minutely adpressed-pubescent, more than twice as long as the 5 oblong blunt lobes. *Style* much exserted. *Fruit* the size of a small pea, glabrous, many-seeded. *Webera mollis*, Hook. fil. Fl. Br. Ind. III. 104.

SINGAPORE: Wallich; Ridley 4915, 5678; Cantlay 76. PENANG: Main-gay (K.D.) 894; Curtis 745, 9362; King's Collector 1336. JOHOR: Ridley

4171. PERAK: Wray 1276, 2994; King's Collector 2955, 5725, 6589.—
DISTRIB. Sumatra.

25. RANDIA, Linn.

Shrubs or trees, unarmed or with axillary or supra-axillary spines. *Leaves* usually coriaceous, sometimes one of a pair larger than the other or absent; stipules short, free or connate. *Flowers* in axillary or (where one leaf of a pair has aborted) leaf-opposed cymes, or solitary or in fascicles or corymbs, rarely terminal, usually white or yellowish. *Calyx-tube* ovoid, obovoid, or turbinate, smooth or ribbed; the limb often tubular, truncate or variously lobed. *Corolla* funnel- or salver-shaped or campanulate, the throat glabrous or hairy; limb with usually not more than 5 short or long lobes twisted in bud. *Stamens* 5; anthers narrow with short filaments or sessile. *Disk* annular or cushion-like. *Ovary* 2- rarely 4-celled; style usually stout sub-fusiform; stigma usually fusiform or clavate, entire or bifid; ovules usually numerous, sunk in placentas attached to the septum. *Fruit* more or less baccate, ovate, ellipsoid or globose, 2-celled, many-seeded. *Seeds* usually immersed in pulp; testa thin, albumen horny, cotyledons orbicular.—DISTRIB. Species about 90, all tropical.

Flowers under .5 in. long, in small fascicles or cymes less than 1 in. in diam., or solitary; corolla with a very short tube, almost rotate; leaves of the pairs equal in size :—

Armed erect shrubs with stout straight spines.

Flowers .4 in. long, solitary or in fascicles of 2 or 3 ...

1. *R. dumetorum*.

Unarmed :—

Erect or scandent; flowers .5 in. long, tube short, lobes long, calyx 4-toothed; corolla 4-lobed, its tube hairy within; anthers linear, sessile; ovary with 4 placentas; fruit not ridged; main-nerves of leaves 10 to 12 pairs ...

2. *R. binata*.

Scandent; flowers .3 to .35 in. long; calyx 5- or 6-toothed; corolla 5- or 6-toothed, its tube glabrous within; anthers broadly ovate, apiculate with filaments as long as themselves; ovary with 2 placentas; fruit with 10 to 12 vertical ridges; main-nerves of leaves 7 or 8 pairs ...

3. *R. impressinervis*.

Flowers under 1 in. long, in short much-branched many-flowered cymes from the axils of fallen leaves; corolla salver-shaped; leaves of the pairs equal in size; fruit like a pepper-corn (unknown in No. 6):—

Scandent, glabrous :—

Unarmed :—

Leaves on short petioles or sub-sessile, their bases slightly oblique and auricled, main-nerves 6 to 8

- pairs; flowers '4 or '5 in. long; calyx truncate, entire or minutely 5-toothed ... 4. *R. auriculata*.
 Leaves on petioles '5 or '6 in. long, narrowed and slightly oblique at the base but not auricled; main-nerves 5 to 7 pairs; flowers nearly 1 in. long; calyx minutely 5-toothed ... 5. *R. Forbesii*.
- Armed:—
 Leaves on petioles '3 to '5 in. long, cuneate at the base; main-nerves 7 to 11 pairs, very bold beneath; flowers '75 in. long; calyx with 5 triangular teeth 6. *R. Curtisii*.
 Trees or large shrubs; leaves on petioles '2 to '3 in. long, not obovate, cuneate but not oblique at the base; main-nerves 7 to 9 pairs; flowers '4 in. long; anthers as long as the corolla-lobes, exserted. ... 7. *R. densiflora*.
 Flowers '75 to 1 in. long, cylindric, coriaceous; leaves of the pairs unequal in size, obovate or oblanceolate, with 10 to 14 pairs of main-nerves; cymes very condensed, many-flowered; fruit large, (1 in. or more in diam.) more or less compressed:—
 Leaves tomentose beneath; cymes rusty-tomentose everywhere ... 8. *R. anisophylla*.
 Leaves glabrous except the midrib and main-nerves beneath; cymes puberulous everywhere ... 9. *R. Scortechinii*.
 Flowers about 1 in. long, axillary, solitary or in pairs, shrubs with straight spines and glabrous thinly coriaceous equal leaves with 6 or 7 pairs of main-nerves; calyx tubular '35 in. long with 5 minute triangular teeth; fruit nearly 2 in. in diam. ... 10. *R. perakensis*.
 Flowers 1'5 to 3 in. long, salver-shaped:—
 Leaves pubescent on the nerves beneath:—
 Shrubs with slender straight spines; calyx '35 in. long, its lobes 5, long, subulate, persisting on the fruit ... 11. *R. fusciculata*.
 Leaves glabrous:—
 Shrubs erect or sub-scandent with stout recurved spines; calyx '25 in. long, its lobes lanceolate acuminate, not persisting in the fruit ... 12. *R. longiflora*.
 Unarmed; leaves thickly coriaceous, 4 to 6 in. long, and 1'75 to 2'25 in. broad; calyx about '9 in. long, corolla-tube about 1 in. long, both coriaceous, throat glabrous, limb 1'5 in. in diam.; anthers included, not apiculate, lobes of stigma short, broad ... 13. *R. Clarkii*.
 Unarmed; leaves thinly coriaceous, 3'5 to 4'5 in. long and 1'5 to 2'5 in. broad; calyx about 4 in. long; corolla about 1 in. long, its throat pubescent; limb 1 to 1'25 in. across; anthers with a dark-coloured apical appendage; lobes of stigma spatulate, reflexed ... 14. *R. penangiana*.

- Flowers 2 to 8 in. long, the corolla with a short cylindric tube and inflated funnel-shaped limb; fruit ovoid-globular ... 15. *R. exaltata*.
 Flowers 4 to 5 in. long, funnel-shaped, 4 in. wide at the mouth; fruit narrowly ellipsoid crowned by the long narrow calyx-teeth ... 16. *R. macrophylla*.
 Imperfectly known species ... 17. *R. Kunstleri*.

1. *RANDIA DUMETORUM*, Lam. Ill. t. 156, f. 4. A shrub or small tree, unarmed or with straight horizontal opposite axillary or slightly supra-axillary spines on the thin sub-quadrangular pale puberulous young branches. *Leaves* membranous, oblong, oblong-ob lanceolate or obovate-lanceolate, acute or sub-acute, narrowed to the base, both surfaces glabrous, only the midrib always hairy and sometimes also the 6 or 7 pairs of spreading faint main-nerves; length 1.5 to 3.5 in.; breadth .6 to 1.25 in.; petioles .1 in. or less long; stipules ovate, acuminate. *Flowers* 4 in. long, 1 to 3 together on a short minutely bracteolate peduncle, sub-sessile. *Calyx* cylindric-campanulate, strigose outside; the mouth with 5 broad erect lobes varying from ovate to spathulate, often acute at the apex. *Corolla* with a short wide tube constricted and hirsute below the wide broadly 5-lobed limb. *Anthers* linear, sub-sessile, included within the vil-lous throat. *Style* thick, stigma with 2 thick, short lobes hardly exserted. *Fruit* globose or ovoid, obscurely ribbed, .75 to 1.5 in. long, glabrous or pubescent, smooth, or obscurely ribbed, yellowish; the pericarp thick. *Seeds* numerous, small, oval, compressed, embedded in pulp. W. & A. Prod. 397; Wight Ic. 580; Brand. For. Flora 273; Miq. Fl. Ind. Bat. II. 226; Koord. & Valet. Bijdr. VIII. 96; Hook. fil. Fl. Br. Ind. III. 110. *R. nutans*, *longispina*, DC. and W. & A., Kurz For. Fl. Burm. II. 45; Wight Ic. 581, 582, 583; Miq. l c. 227. *R. Rottleri*, W. & A. l c. *R. stipulosa*, Miq. Fl. Ind. Bat. II. 228. *R. spinosa*, Blume Bijdr. 981. *R. malabarica*, Wall. Cat. 8255E. *Gardenia nutans*, Roxb. Hort. Beng. 15; Wall. Cat. 8290. *G. spinosa*, Linn. fil. *G. longispina* and *floribunda*, Roxb. *G. dume-torum*, Retz. Roxb. Corom. pl. t. 136; Wall. Cat. 8259. *G. glabra* and *G. propinqua*, Br. in Wall. Cat. 8258, 8260. *Posoqueria dumetorum*, *P. nutans*, *P. longispina*, and *P. floribunda*, Roxb. Fl. Ind. I. 713 to 719.

LANGKAWI: *Curtis* 2799. KEDAH: *Curtis* 2585. PERAK: *Wray* 2599; *King's Collector* 3168, 6495; *Scortechini* 95, 98, 175, 1017, 1933.—DIS-TRIB. Java; Sumatra; British India.

VAR. *pubescens*, King & Gamble. *Leaves* more or less densely pubescent on both surfaces; spines sometimes .65 in. long; fruit obpy-riform.

KEDAH: *Curtis* 2585. LANGKAWI: *Curtis* 2799.

2. *RANDIA BINATA*, King & Gamble n. sp. A shrub occasionally scandent, glabrous, unarmed; young branches thicker than a crow-quill,

angled, pale-brown or cinereous when dry. *Leaves* coriaceous, oblong-elliptic, gradually but rather bluntly acuminate, rounded and somewhat unequal-sided or narrowed; both surfaces dull-brown when dry, opaque, the midrib very prominent on the lower surface; main-nerves 10 to 12 pairs, curved, spreading, more prominent on the lower than on the upper surface; length 6 to 9 in.; breadth 2 to 2.75 in.; petioles .1 in. or less; stipules triangular, keeled, acute, about as long as the petioles, sometimes forming a connate 4-toothed tube. *Flowers* about .5 in. long; their pedicels about .3 in., collected in fascicles on tubercle-like, very shortly branched, minutely bracteolate cymes in the axils of fallen leaves. *Calyx* narrowly campanulate, constricted about the middle; the mouth truncate but with 4 minute sharp teeth. *Corolla* slightly longer than the calyx, salver-shaped; the tube cylindric, hairy within, shorter than the 4 oblong obtuse spreading lobes of the limb. *Anthers* linear, sessile, exserted. *Stigma* exserted, with 2 ovate-oblong spreading thick lobes. *Ovary* 2-celled, with numerous ovules on 4 placentas. *Fruit* the size and shape of a pepper-corn, smooth; seeds numerous, triangular, somewhat compressed; the testa pitted, shining, pale-brown.

PERAK: Wray 2134; King's Collector 4007, 5620, 5631, 7504.

3. *BLANDIA IMPRESSINERVIS*, King & Gamble n. sp. A climber; young branches twice as thick as a crow-quill, dark-brown, minutely pubescent. *Leaves* subsessile, coriaceous, elliptic-oblong or elliptic, shortly acuminate, somewhat narrowed to the rounded or acute base; both surfaces brown, the upper tinged with olivaceous and shining, the lower paler, dull; main-nerves 7 or 8 pairs, spreading, curved, and interarching at some distance from the edge, depressed on the upper surface and raised on the lower, the veins rather prominent on the lower; length 3.25 to 4.5 in.; breadth 1 to 1.75 in.; petioles under .1 in.; stipules about .15 in. long, broadly triangular at the base with a long acuminate apex, pubescent. *Flowers* .3 to .35 in. long, on pubescent pedicels from .5 to .15 in. long, in short cymes from the axils of fallen leaves, sub-globular and less than 1 in. in diam.; the branches very short, and with small bracteoles. *Calyx* pubescent outside, campanulate; the limb as long as the tube, truncate but with 5 or 6 minute teeth. *Corolla*-tube .125 in. long, glabrous within, the limb longer than the tube with 5 or 6 oblong blunt spreading lobes. *Anthers* broadly ovate, apiculate, exserted, on filaments as long as themselves. *Stigma* exserted, clavate, separating into 2 broad lobes; *ovary* 2-celled with many ovules on 2 placentas. *Fruit* like a small peppercorn, with 10 to 12 vertical ridges, glabrous; seeds compressed, triangular, grooved.

PERAK: Wray 2158; Scortechini 254; King's Collector 3336, 4894, 10399, 10821.—DISTRIB. Borneo, Haviland 1895, 2969.

4. *RANDIA AURICULATA*, K. Schumann in Engl. Pflanzen fam. Teil. IV. Abt. 4, p. 75. Scandent, sometimes shrubby, glabrous, unarmed; young branches thinner than a goose-quill, compressed, dark-brown. *Leaves* coriaceous, brown when dry, elliptic, elliptic-oblong or oblong, subacute or obtuse; the base slightly oblique, somewhat auricled; upper surface shining, the lower dull and usually paler; main-nerves 6 to 8 pairs, spreading, slightly curved, thin but prominent on the lower surface; length 4 to 6.5 in.; breadth 1.5 to 3.5 in.; petioles .05 to .15 in.; stipules triangular acuminate, slightly longer than the petiole, deciduous. *Cymes* from the axils of fallen leaves or terminal, pedunculate, trichotomous, from 2 to 4 in. across, many-flowered, puberulous, and with many small triangular persistent bracteoles; the peduncles compressed, from 1 to 1.5 in. long. *Flowers* from .4 to .5 in. long, sub-sessile, almost coriaceous, mostly with a pair of connate minute bracteoles at the base. *Calyx* funnel-shaped, the mouth wide, sub-truncate or minutely 5-toothed. *Corolla* tubular, deeply divided into 6 oblong reflexed lobes twisted in bud; the throat densely pubescent. *Anthers* .2 in. long, linear, with acute tips. *Style* .3 in. long, with 2 free ribbed arms. *Fruit* the size of a peppercorn, its apex crowned at first by the deciduous short calyx, glabrous, 2-celled, with many minute seeds. *Anomanthodia auriculata*, Hook. fil. in Bth. and Hook fil. Gen. Plant. II. 87; Fl. Br. Ind. III. 108. *Webera auriculata*, Wall. in Roxb. Fl. Ind. ed. Carey. & Wall. II. 537. *Stylocoryna auriculata*, Wall. Cat. 8402. *Cupia auriculata*, DC. Prod. IV. 394. *Pseudixora*? *auriculata*, Miq. Fl. Ind. Bat. II. 210. *Psychotria*? Wall. Cat. 8338. *Randia corymbosa*, Benth. MSS. (name only) Koord. & Valet. Bijdr. VIII. 88.

In all the provinces common.—DISTRIB. Malayan Archipelago.

In inflorescence this closely resembles *R. densiflora*.

5. *RANDIA FORBESII*, King & Gamble n. sp. A large climber 60 to 80 feet long, all parts except the branches of the cyme and the outside of the calyx glabrous; young branches twice as thick as a crow-quill, dark when dry; unarmed. *Leaves* coriaceous, elliptic to ovate, acute or shortly acuminate, narrow and slightly oblique but not auriculate at the base; both surfaces brown when dry, the lower paler; main-nerves 5 to 7 pairs, spreading, prominent on the lower surface, depressed on the upper; length 4.5 to 7 in.; breadth 2 to 3 in.; petioles .5 to .6 in., rather slender; stipules triangular-subulate, .2 in. long. *Cymes* from the axils of fallen leaves, pedunculate, about half as long as the leaves, many-flowered; the branches spreading and puberulous, 3 or 4 in. in diam.; bracteoles minute, ovate, acute, lanceolate, persistent; peduncle .75 to 1 in. long. *Flowers* nearly 1 in. long, on short pedicels often bracteolate at the base. *Calyx* tubular, slightly widened at

the minutely and acutely 5-toothed mouth, puberulous outside, .25 in. long. *Corolla* salver-shaped, about 3 times as long as the calyx; the tube narrow; the limb with 5 rather blunt oblong lobes twisted in bud. *Stamens* 5 linear, notched at the apex, included in the tube and slightly longer than its lobes. *Style* half as long as the corolla, slender, the stigmatic lobes thick, reflexed. *Fruit* like a pepper-corn, glabrous, surmounted by the scar of the deciduous calyx, many-seeded.

PENANG: *Curtis* 818. SINGAPORE: *Ridley* 3664, 5662. PERAK: *Scortechini* 1308; *King's Collector* 8273, 10001.—DISTRIB. Lampongs, Sumatra, *Forbes* 1659; Andaman Islands, *King's Collector*.

6. *RANDIA CURTISII*, King & Gamble n. sp. A large climber, all parts except the calyx and flower-pedicels glabrous; young branches thinner than a goose-quill, pale-brown when dry, armed; the spines in pairs, recurved. *Leaves* varying much in size, coriaceous, oblong-elliptic, acute or shortly acuminate, the base cuneate, upper surface brown when dry, the lower pale olivaceous; main-nerves 6 to 11 pairs, rather straight, curving upwards and inter-arching rather far from the edge, very bold on the lower surface, somewhat depressed on the upper, as is the midrib; reticulations wide, obsolete on the upper surface, rather prominent on the lower; length 4.5 to 7 in.; breadth 1.5 to 2.25 in.; petioles .3 to .5 in.; stipules triangular, acuminate, shorter than the petioles, deciduous. *Cymes* from the axils of fallen leaves or terminal, shortly pedunculate, spreading, from 1 to 2 in. long, branching from the base; branches spreading and bearing many boat-shaped minute ovate-acute glabrous bracts; the large cymes 1.5 to 2 in. in diam. and many-flowered, the smaller little-branched and few-flowered. *Flowers* .75 to 1 in. long, on pubescent pedicels .1 to .4 in. long. *Calyx* narrowly tubular-campanulate, adpressed-pubescent outside; the mouth with 5 triangular acute teeth. *Corolla* white, salver-shaped, glabrous outside, tube narrow; limb with 5 oblong-elliptic, blunt or acute spreading lobes; throat and tube inside pubescent. *Anthers* exserted, linear, about as long as the corolla-lobes. *Style* stout; stigma clavate, 2-lobed.

PENANG: *Curtis* 3590. PERAK: *Wray* 2611; *King's Collector* 3305, 4882, 6507, 6814, 8480.

7. *RANDIA DENSIFLORA*, Benth. *Flora Hongkong* 155. A glabrous tree, often as high as 60 feet; young branches thinner than a goose-quill, pale-brown, 4-angled. *Leaves* coriaceous, elliptic-oblong to oblong-lanceolate, acute or subacute, rarely acuminate, the base cuneate; both surfaces brown when dry, tinged with olivaceous, the lower usually paler; main-nerves 8 or 9 pairs, rather straight, ascending, thin but prominent on the lower surface, slightly depressed on the upper; length

4 to 6 in.; breadth 1.75 to 2.75 in.; petioles .25 to .3 in.; stipules triangular, acuminate, shorter than the petioles, caducous. *Oymes* from the axils of fallen leaves, many-flowered, almost sessile, much branched from near the base, 2 to 4 in. in diam., the branches puberulous, spreading and bearing many acute persistent bracteoles. *Flowers* .4 in. long, on pedicels equalling or exceeding the calyx. *Calyx* tubular-campanulate, about .1 in. long, the mouth with 5 minute acute teeth. *Corolla* with a short tube hairy on the throat inside; the limb with 5 oblong blunt minutely cuspidate reflexed lobes equalling in length the 5 linear exserted *anthers*; filaments dorsifixed. *Style* much exserted, stigma fusiform. *Fruit* like a pepper-corn. Hook. fil. Fl. Br. Ind. III. 112. Koord. & Valet. Bijdr. VIII. 93. *Webera densiflora*, Wall. in Roxb. Fl. Ind. III. ed. Carey & Wall. II. 536. *W. oppositiflora*, Roxb. Fl. Ind. I. 698; Kurz For. Fl. Burm. II. 47. *Stylocoryna densiflora*, Wall. Cat. 8404 excl. A. Miq. in Ann. Mus. Lugd. Bat. IV. 128, t. 5 A. *S. dimorphophylla*, Teyssm. & Binn. Pl. Nov. Hort. Bog. 4. *Cupia densiflora* and *C. oppositiflora*, DC. Prod. IV. 394. *Gnaphalis axilliflora* and *G. oblongata*, Miq. Fl. Ind. Bot. II. 221. *Urophyllum coriaceum*, Miq. l.c. Suppl. 542. *Ixora Thozetia*, F. Mull. Fragm. II. 132. *Psychotria*, sp. Wall. Cat. 8332. *Rubiacea*, Wall. Cat. 8455, 8456, 8465.

Common in all the provinces.—DISTRIB. Malayan Archipelago; Hongkong; North Australia.

VAR. *parvifolia*, King & Gamble. *Leaves* narrowly oblong-elliptic, 3 to 5 in. long and 1.25 to 2.75 in. broad; petioles .15 to .2 in.

PENANG: Curtis 796; Ridley 10243. PERAK: Scortechini 811, King's Collector 1585.

8. *RANDIA ANISOPHYLLA*, Jack in Roxb. Fl. Ind. ed. Carey and Wall. II. 561. A small unarmed tree; young branches at first rusty-tomentose but soon sub-glabrous, pale, and striate, as thick as a goose-quill. *Leaves* of each pair unequal, coriaceous, obovate-elliptic, shortly cuspidate, much narrowed from the middle to the base; upper surface dark-brown when dry, glabrous except the shortly tomentose depressed midrib and nerves; lower surface paler, tomentose on the midrib, pubescent especially on the transverse veins and on the 10 to 14 pairs of bold spreading main-nerves; length of the longer of each pair 8 to 10 in., of the smaller 3 to 6 in.; breadth of the longer 3 to 5 in., of the smaller 1.5 to 3 in.; petioles .3 to 1 in., tomentose, stipules lanceolate, acuminate, tomentose, as long as petioles. *Oymes* pedunculate, rusty-tomentose everywhere, crowded, spreading, 1.5 to 2 in. in diam. with numerous lanceolate acuminate bracteoles .2 to .25 in. long; the peduncles about as long as the leaf-petioles. *Flowers* coriaceous, .75 in. long, on short pedicels or sub-sessile. *Calyx* tubular-campanulate, with 5 acute lobes or

teeth. *Corolla* longer than the calyx, tubular, its lobes oblong. *Anthers* linear, sub-sessile near the base of the tube. *Style* fusiform. *Fruit* 1 to 1.5 in. long, bluntly ellipsoid, somewhat compressed, minutely tomentose, crowned by the rather large tubular calyx. Hook. fil. Fl. Br. Ind. III. 114; DC. Prod. IV. 381. *Gardenia anisophylla*, Jack, Miq. Fl. Ind. Bat. II. 230. *G. ? anisophylla*, Wall. Cat. 8399 A.

PENANG: *Jack & Porter*; *Wallich* 8284 D.; *Curtis* 164; *Hullett* 162. MALACCA: *Derry* 27. SINGAPORE: *King's Collector* 1234.—DISTRIB. Sumatra, *Forbes* 2954, 3088.

A Bornean species, represented in Herb. Kew. by Beccari's 760 and Haviland's 3420, is allied to this, but its calyx has long teeth and much woolly hair. It is evidently undescribed and might be named *R. Beccarii*.

9. *RANDIA SCORTECHINII*, King & Gamble n. sp. An armed tree 20 to 60 feet high; young branches usually thicker than a goose-quill, glabrous, the bark pale when dry. *Leaves* of the pairs not very unequal, membranous, obovate-elliptic to oblanceolate-elliptic, obtuse or abruptly acute or minutely cuspidate, much narrowed from above the middle into the glabrous petiole; both surfaces brown when dry, rarely tinged with green and both glabrous except for a few scattered hairs on the nerves on the lower; main-nerves 14 to 18 pairs, little-curved, spreading, prominent on the lower surface, rather faint as the upper, veins on the lower prominent, transverse, wavy; length of the larger leaf of the pair 8 to 16 in.; breadth 4 to 6 in.; length of the smaller leaf 5 to 8 in.; breadth 3 or 4 in.; petioles .75 to 1.5 in.; stipules ovate, connate by their bases. *Cymes* pedunculate, leaf-opposed (from the fall of the subtending leaf), many-flowered, much-branched, spreading, 2 to 2.5 in. in diam., everywhere puberulous; bracteoles numerous, broadly triangular, persistent; peduncles .75 to 1 in. long. *Flowers* about 1 in. long, puberulous everywhere. *Calyx* tubular, the mouth truncate but usually with 5 small teeth. *Corolla* cylindric, .75 in. long, with 5 short lobes. *Anthers* linear, nearly half as long as the corolla, dorsifixed and inserted near its base. *Ovary* two-celled, each cell multi-ovulate. *Style* short, stigma clavate, sulcate. *Fruit* sub-globular, somewhat compressed, densely puberulous, about 1 in. in diam., crowned by the short calyx-tube.

PERAK: *Scortechini* 574, 170; *Wray* 3031, 187, 3212, 1381; *King's Collector* 3455, 3696, 7205, 4485, 6786, 10131. SINGAPORE and PENANG: *Curtis* 164.—DISTRIB. Borneo, *Beccari* 2599; *Haviland* 84, 697, 2161.

10. *RANDIA PERAKENSIS*, King & Gamble n. sp. A small armed glabrous tree 12 to 18 feet high; young branches thinner than a quill, pale cinereous, glabrous, often armed with stout flower-bearing spines 1 to 1.25 in. long. *Leaves* thinly coriaceous, narrowly elliptic, tapering to each end, the apex bluntly acuminate; both surfaces

brown, the lower paler ; upper surface dark-brown when dry, the nerves invisible ; the lower pale-brown, the main-nerves 6 or 7 pairs, very distinct, curved, interarching at some distance from the edge, the reticulations rather distinct ; length 3 to 5 in. ; breadth 1·4 to 2 in. ; petioles ·1 to ·2 in. ; stipules triangular, acuminate. *Flowers* 1 in. long, on very short pedicels, solitary or in pairs from short branches which ultimately become spines. *Calyx* tubular, ·35 in. long, contracted at the base, the mouth with 5 narrowly triangular short teeth. *Corolla* salver-shaped ; the tube ·45 in. long and nearly ·2 in. wide, the limb ·75 in. across with 5 or 6 oblong blunt lobes. *Anthers* linear, subsessile at the base of the tube, about ·3 in. long. *Style* short, stout, shorter than the cylindric stigma. *Fruit* globular, smooth, surmounted by the short scar of the calyx, 1·75 in. in diam. ; pericarp very thick ; *seeds* ellipsoid, compressed, ·25 in. long.

PERAK, *King's Collector* 7450, 8356.

11. *RANDIA FASCICULATA*, DC. Prod. IV. 386. A much-branched armed shrub ; young branches thicker than a crow-quill, rough from small tubercles and softly and minutely pubescent. *Leaves* membranous, lanceolate, ovate or oblong-lanceolate, shortly acuminate (often bluntly so), rounded or cuneate at the base ; both surfaces olivaceous, the upper usually glabrous or nearly so, the lower paler, minutely pubescent usually on the midrib and nerves only but sometimes on the spaces between ; main-nerves 4 to 6 pairs, slightly curved, ascending, distinct on the lower surface, almost obsolete on the upper ; length ·75 to 3 in. ; breadth ·5 to 1·5 in. ; petioles ·05 to ·2 in., pubescent ; stipules broadly triangular, much acuminate, about as long as the petioles ; spines axillary, slender, straight, ascending, slightly longer than the petioles, (sometimes absent). *Flowers* 1·5 to 2 in. long, axillary (under 1 in. in var. *parviflora*) solitary or in fascicles of 2 or 3, bracteoles lanceolate, acuminate, hairy. *Calyx* ·35 in. long ; the tube narrowly funnel-shaped, villous, the mouth with 5 narrow subulate teeth as long as the tube. *Corolla* salver-shaped, the tube nearly 1 in. long, about ·05 in. in diam., glabrous outside, pubescent inside ; limb nearly 1 in. across with 5 deep elliptic to oblong-elliptic, obtuse or sub-acute lobes. *Anthers* half-exserted from the throat, linear, not apiculate, ·3 in. long. *Style* slender ; stigma exserted, with 2 short broad ovate blunt lobes. *Fruit* pisiform, 2-celled, 4-seeded, sparsely pubescent, crowned by the long-toothed calyx-tube. Brandis For. Flora 273 ; Hook. fl. Fl. Br. Ind. III. 109 *R. rigida*, DC. l.c. *R. malabarica*, Wall. Cat. 8255 A. B. C. D. *Gardenia fasciculata*, Roxb. Hort. Beng. 15. *G. rigida* and *G. parviflora*, Wall. Cat. 8257 A. B. *Posoqueria fasciculata*, Roxb. Fl. Ind. 1717. *P. rigida*, Wall. in Roxb. Fl. Ind. ed. Carey & Wall. II. 570. *Webera fasciculata*, Kurz For. Flora Burm. II. 49.

KEDAH: *Curtis* 2549. PENANG: *Curtis* 718, 1498. PROV. WELLESLEY: *Curtis* 7106. PERAK: *Scortechini* 1802; *Wray* 3467.

VAR. *parviflora*; tube of corolla only about .75 in. long, very narrow; the limb .75 in. in diam.

LANGKAWI: *Curtis* 3383.

Roxburgh's unpublished figures of *Posoqueria fasciculata* and *Gardenia rigida* are practically alike. The only differences are that the leaves of the former are depicted as ovate-lanceolate and 2.25 to 3 in. long; the limb of the corolla as yellow, its tube as .75 in. long and white; the calyx under .2 in. long with teeth one quarter of its length; while *Randia rigida* is shown as having ovate leaves only 1.5 in. long; corolla-limb white and the tube 1 in. long, also white; the calyx .3 in. long with filiform teeth half as long as the tube. The former he attributes to Nepal, the latter to Singapore. The two are evidently forms of the same widely distributed species.

12. *RANDIA LONGIFLORA*, Lam. Dict. II. 227; Ill. t. 156, f. 3. A glabrous shrub, sometimes scandent, usually armed; young branches twice as thick as a crow-quill, or thicker, pale-brown, shining, usually bearing stout curved axillary spines .3 in. or more in length. Leaves coriaceous, oblong, oblong-lanceolate or obovate-elliptic, acute or shortly cuspidate, the base cuneate; both surfaces pale-olivaceous green when dry, dull; main-nerves 5 or 6 pairs, rather straight, ascending, faint on both surfaces but especially on the upper; length 1.5 to 3.75 in.; breadth .75 to 1.75 in. (larger in var.); petioles .1 to .15 in.; stipules about as long as the petioles, broadly triangular, with abrupt acuminate apices. Cymes terminal or axillary, umbellate, as long as or longer than the leaves (shorter in var.), few-flowered, on peduncles .25 to .4 in. long; bracteoles few, ovate, acute. Flowers 1.5 (rarely 2 in.) long, white; their pedicels from .25 to .4 in., bracteolate about the middle. Calyx narrowly infundibuliform, .25 in. long (.5 in. in var.) the mouth with 5 lanceolate acuminate teeth. Corolla salver-shaped, tube .75 to 1.5 long and less than 1 in. wide; the throat pubescent; the limb 1 in. or more across with 5 oblong blunt spreading or reflexed lobes. Anthers linear, reflexed, exserted, much shorter than the corolla-lobes. Style filiform; stigma broadly clavate, exserted, separating into 2 spatulate lobes. Fruit globose-ovoid, glabrous, .35 to .5 in. long, its stalk somewhat longer; calyx-scar truncate, conspicuous; seeds rugose, embedded in pulp. DC. Prod. IV. 386; Hook. fil. Fl. Br. Ind. III. 111 (in part). *R. scandens*, DC. l.c. 387. *Posoqueria longiflora*, Roxb. Fl. Ind. I. 718. *Webera scandens*, Roxb. l.c. I. 698. *W. longiflora*, Kurz, For. Flora Burm. II. 48. *Canthium recurvum*, Wall. Cat. 8284 (all the sheets except D.) in Herb. Linn. Soc.

MALACCA: *Griffith* (K.D.) 2802, 2803, 2805, 2807. *Maingay* (K.D.)

900. SINGAPORE: *Lobb*; *Schomburg* 59; *Ridley* 2415, 9487. PERAK: *Wray* 2507; *King's Collector* 308, 5231; *Hullett* 93.—DISTRIB. Borneo.

Except that it has spines the plant here described agrees in all respects with Roxburgh's *Webera scandens* of which he has left a coloured drawing in the Calcutta Herbarium. Roxburgh's figure and description of his *Posoqeria longiflora* also agree with this, except in being arboreous. Lamarck's figure of *R. longiflora* agrees with Roxburgh's except in having smaller leaves.

VAR. *major*, King & Gamble; young branches sometimes nearly as thick as a goose-quill, leaves 4 to 6 in. long and 1.75 to 3 in. broad; cymes shorter than the leaves; calyx .5 in long.

PUNGAH: *Curtis*.—DISTRIB. Burma, *Helfer* (K.D.) 2906; *McClelland*; Andaman Islands, *King's Collector*.

13. *RANDIA CLARKEI*, King & Gamble n. sp. Quite glabrous: young branches thinner than a goose-quill, pale-brown when dry. *Leaves* thickly coriaceous, oblong-elliptic, subacute, the base rounded or slightly cuneate, both surfaces dark-brown when dry, the lower slightly olivaceous, the midrib on both thick and the 4 or 5 pairs of slightly curved ascending main-nerves faint; length 4 to 6.5 in., breadth 1.75 to 2.5 in.; petioles .5 to .6 in., thick. *Cymes* in the axils of fallen leaves or terminal, 3- or 4-flowered, the bracts broadly ovate, acute, persistent. *Flowers* 2.5 to 3 in. long, coriaceous. *Calyx* narrowly funnel-shaped, tapering much towards the base, about .9 in long; the mouth with 5 small acute triangular teeth. *Corolla* salver-shaped, the tube 1 in. long and .15 in. in diam.; its throat glabrous; the limb 1.5 in. across, deeply divided into 5 ovate-lanceolate, spreading lobes. *Anthers* sessile, included in the tube, linear, .3 in. long. *Style* as long as the corolla-tube; stigma exserted, short, thick, separating into 2 broad lobes. *Canthium recurvum*, Wall. Cat. 8284 D. in Herb. Kew. (not D. in Herb. Linn. Soc.)

MALACCA: *Maingay* (K.D.) 840.

The type sheet of this species was included by Wallich in his *Canthium recurvum*, of which it stands in the Kew set as sheet D. It differs from the other sheets which belong to *Randia longiflora* in its greatly longer calyx and also larger more coriaceous corolla, which has a wider tube, glabrous in the throat as elsewhere, included anthers, and a much shorter stigma which opens out into 2 short broad lobes. The leaves of this are also larger and thicker than those of *R. longiflora*.

14. *RANDIA PENANGIANA*, King & Gamble n. sp. A large glabrous armed climber; young branches twice as thick as a crow-quill, dark coloured when dry, armed with stout axillary recurved spines .3 in. long. *Leaves* thickly membranous, elliptic, sometimes slightly obovate, shortly and bluntly acuminate, the base cuneate, both surfaces brown when dry, the lower somewhat the paler and tinged olivaceous; main-nerves 5 to 7 pairs, rather straight, oblique, faint on both surfaces;

length 3 to 4.5 in.; breadth 1.5 to 2.5 in. petiole .2 to .3 in. slender; stipules shorter than the petioles, broadly triangular at the base, much acuminate upwards. *Cymes* terminal or from the axils of fallen leaves, on pedicels about .2 in. long; the branches short and bearing persistent ovate-acute bracteoles. *Flowers* few, about 2 in. long, on pedicels about 2 in. long. *Calyx* .4 in. long, tubular, tapering to the base, the mouth with 5 triangular acute short teeth. *Corolla* salver-shaped; the tube 1 in. long and about .1 in. in diam.; the limb about 1 to 1.25 in. across, deeply divided into 5 broadly elliptic subacute lobes. *Anthers* linear, with a black apical process from the connective, included in the slightly pubescent throat, sessile, dorsifixed, about .2 in. long. *Style* filiform; stigma somewhat exserted, thick, clavate, opening out into 2 thick spatulate reflexed fleshy lobes. *Fruit* depressed-globular, glabrous, .5 to .65 in. in diam. when dry.

PENANG: *Curtis* 927. SINGAPORE: *Hullett*, 114.

The following, of which we have seen no specimens in flower, also probably belong to this species; *viz*: Malacca: *Derry* 1056. Perak: *Scortechini* 1538; *King's Collector* 10171. One of Mr. Curtis's specimens is described as a tree, another as a climber. The leaves are thinner and broader than those of *R. floribunda*, Lam., and the flowers are (especially as regards the limb of the corolla) larger. The calyx although of the same shape is also larger. This species still more nearly resembles *R. Clarkei*, King & Gamble (of which the type is Wall. Cat. 8284 D.) but it has smaller, much less coriaceous leaves, which are broader in proportion to their width. This has also smaller flowers with a very much smaller calyx. From both it differs by its conspicuously apiculate anthers.

15. *RANDIA EXALTATA*, Griff. Notul. IV. 262. A tree 30 to 50 feet high, unarmed; young branches deciduously pubescent, ultimately glabrous, dark-coloured and striate when dry, thinner than a goose-quill. *Leaves* coriaceous, glabrous, oblong-lanceolate, acuminate at base and apex; upper surface dark-brown when dry, not reticulate, the nerves and midrib depressed; lower surface paler, reticulate; main-nerves 8 to 10 pairs, curved, ascending, thin, dark in colour and distinct beneath when dry; length 3.5 to 4.5 in.; breadth 1 to 1.35 in.; petioles .2 in.; stipules triangular, acuminate, about as long as the petioles and like them rusty-pubescent. *Cymes* in the axils of leaves or of fallen leaves, when in flower half as long as the leaves, adpressed rusty-pubescent; branches few, bearing small persistent acute bracts and 4 to 6 large shortly pedicellate flowers. *Calyx* .15 in. long, funnel-shaped; densely adpressed-pubescent outside, the mouth truncate but minutely 5-toothed. *Corolla* white, somewhat purplish, 2 in. or more long, rather sparsely adpressed-pubescent outside; the tube narrowly cylindric, only about .3 in. long, villous at the throat; the limb widely funnel-shaped, scurfily hairy inside; the mouth with 5 broad subacute lobes .3 or .35

in. long. *Anthers* linear, .4 in. long, sessile, dorsifixed above the throat. *Style* filiform 1 in. long, surmounted by the fusiform 2-lobed stigma. *Berry* globular-ovoid, smooth, woody, 2.5 in. in diam., on a thick peduncle .5 in. long. *Seeds* embedded in pulp, compressed, angled, nearly .5 in. broad. Hook. fil. Fl. Br. Ind. III.; Kurz For. Fl. Burma. II. 46 (in part), Koord. & Valet. Bijdr. VIII. 90. *Gardenia pulcherrima*, Kurz in Journ. As Soc. 1877 II. 155; For. Flora Burm. II. 43 (in part). *Gardenia Schoemanni*, Teys. & Binn. in Ned. Kruidk. Arch. III. 403; in Nat. Tijds. II. 201; Miq. Fl. Ind. Bat. II. 232.

PENANG: *Curtis* 793.—DISTRIB. Andaman Islands; Burma (*Griffith* K.D. 2826).

The Andaman plant included under *R. exaltata* by Kurz differs from Griffith's in having obovate leaves and a smaller corolla with a long tube.

16. *RANDIA MACROPHYLLA*, Benth. & Hook. fil. Gen. Plant. ex Hook. fil. Fl. Br. Ind. III. 114. An erect unarmed shrub 3 or 4 feet high; young branches thinner than a goose-quill, dark-coloured when dry, scaberulous-puberulous. *Leaves* large, coriaceous, almost sessile, narrowly elliptic-oblong, sometimes shortly acuminate, gradually narrowed to the acute base; upper surface olivaceous-brown when dry, glabrous except sometimes for a few hairs on the midrib; lower darker, usually glabrous, but sometimes sparsely pubescent on midrib and nerves; main-nerves 10 to 14 pairs, slightly curved, ascending, depressed on the upper, prominent on the lower surface; length 8 to 12 in.; breadth 1.75 to 2.75 in.; petioles .1 to .15 in. pubescent, stipules .4 to .5 in. long, triangular, with a broad base and long subulate-acuminate apex. *Flowers* 1 or 2 in a leaf-axil, subsessile, 4.5 to 6 in. long, with many subulate hairy bracts at the base. *Calyx-tube* funnel-shaped, about .35 to .5 in long; the mouth with 5 linear spreading teeth much longer than the tube. *Corolla* 4 to 5 in. long, infundibuliform, 3 or 4 inches wide at the mouth, white or with purple spots, puberulous or sub-glabrous outside; the limb with 5 ovate sub-acute lobes about 1 in. long. *Anthers* linear, about .8 in. long, included in the glabrous throat. *Style* slender; stigma clavate, nearly as long as and parallel to the anthers. *Fruit* ellipsoid, sparsely and deciduously rusty-strigose, 2.5 in. long, crowned by the long, persistent calyx-lobes. *Rothmannia macrophylla*, R. Br. in Wall. Cat. 8304.

PENANG: *Wallich*, *Curtis* 966. MALACCA: *Griffith* (K.D.) 2822; *Maingay* (K.D.) 944; *Cuming* 2365; *Hervey*, *Derry* 43, 79. SINGAPORE: *Lobb* 65; *Dr. T. Anderson* 107; *H. J. Murton* 1; *Hullett* 117. PERAK: *Wray* 1380, 1632, 3232, 4214; *Scortechini* 1479; *King's Collector* 769, 10356. PENANG: *Curtis* 966; DINDINGS: *Curtis*. SELANGOR: *Gooderoy* 10484.—DISTRIB. Sumatra.

17. *RANDIA KUNSTLERI*, King & Gamble n. sp. A stout glabrous armed climber; young branches thinner than a goose-quill, pale-brown, 4-angled, shining; spines in pairs, slightly curved, slender, much deflexed, about .5 in. long. *Leaves* coriaceous, broadly ovate to elliptic-rotund, obtuse or bluntly and shortly cuspidate; both surfaces pale hepatic-brown when dry; main-nerves 4 or 5 pairs, curved, ascending, rather prominent on both surfaces when dry; length 4 to 5.5 in.; breadth 2.5 to 3.5 in.; petioles .3 to .5 in.; stipules longer than the petioles, oblong, sub-acute. *Flowers* solitary or in scanty cymes, on short pedicels. *Calyx* tubular, the limb truncate but obscurely toothed. *Fruit* deflexed, on a short pedicel, depressed-globular, slightly contracted towards the base, crowned by the short tubular truncate calyx-limb, about 1.25 in. in diam. when dry and somewhat less in length; pulpy; pericarp leathery, smooth, shining. *Seeds* numerous, horizontal, compressed; albumen horny, scanty; radicle longer than the orbicular cotyledons. Wall. Cat. 8284 C. (in Herb. Kew, not in Linn. Soc.)

PERAK: *King's Collector* 2683, 4335; *Scortechini* 485. SUMATRA: *Curtis* 3543.

Scortechini's specimens of this in our hands are not in flower. From the field note on one of them we quote the description of the flower as follows. "*Calyx-tube* .5 in. long, two-thirds being produced beyond the ovary, cylindric, slightly constricted in the middle; the limb with 5 shallow teeth, glabrous outside and inside except for an interrupted ring of yellowish thick hairs at the mouth inside. *Corolla-tube* .5 in. long; the lobes as long, greenish yellow, glabrous except at the throat where are attached the slightly exserted linear *anthers*. *Ovary* 2-celled; each cell with many ovules in several series; stigma oblong, shortly 2-fid. *Berry* 1 in. in diam., not ribbed, crowned by the persistent calyx-tube."

26. GARDENIA, Linn.

Shrubs or trees, often armed. *Leaves* opposite, rarely ternate; stipules often connate. *Flowers* often large, terminal or axillary, solitary, fascicled, rarely cymose, sometimes dimorphic and polygamous. *Calyx-tube* campanulate or tubular; the limb variable, tubular or dilated, sometimes spathaceous, often persistent on the fruit. *Corolla* various, longer than the calyx-limb; 5- to 12-lobed; the lobes twisted in bud. *Stamens* as many as the corolla-lobes. *Anthers* linear, included, sessile or sub-sessile on the tube, as many as the corolla-lobes, and alternate with them. *Ovary* 1-celled; style stout; stigma clavate, fusiform or bifid; ovules numerous, 2-seriate on the 2 to 6 placentas. *Fruit* often large, ovoid, ellipsoid or globose, baccate, with a coriaceous epicarp and woody endocarp which sometimes splits vertically at the sutures. *Seeds* numerous, imbedded in the placental pulp, compressed; testa

thin; albumen horny; embryo minute.—DISTRIB. About 60 species, tropical and sub-tropical.

Calyx narrowly campanulate, its lobes long, linear, spreading:—

Corolla-lobes under .5 in. in length, oblong; fruit sub-globular, .5 to .75 in. in diam. ... 1. *G. tentaculata*.

Corolla-lobes 2.25 to 4 in. long; fruit ovate-oblong, 2.5 in. long ... 2. *G. stenopetala*.

Calyx campanulate, boldly 5-keeled; the mouth expanded, sub-truncate or with 5 large deep keeled lobes; corolla-tube .5 to 1 in. long; fruit ribbed ... 3. *G. carinata*.

Calyx tubular, smooth; fruit smooth:—

Calyx much shorter than the corolla:—

Calyx .5 in. long, the mouth with 5 triangular acuminate keeled teeth; corolla 1.5 in. long, widely campanulate suddenly contracted into a cylindrical tube .25 in. long, the lobes of the limb deep, oblong, obtuse ... 4. *G. Godefroyana*.

Calyx .4 to .65 in. long; the mouth truncate, sometimes split on one side; corolla-tube 1.75 to 2.5 in. long ... 5. *G. tubifera*.

Calyx .75 to 1.5 in. long, inflated-tubular, the mouth oblique with a few irregular lobes; corolla-tube 2.5 to 3 in. long ... 6. *G. speciosa*.

Calyx 3 to 4 in. in length; nearly as long as the tube of the corolla ... 7. *G. Griffithii*.

1. GARDENIA TENTACULATA, Hook. fil. in Fl. Br. Ind. III. 119. An unarmed shrub or small tree; young branches thinner than a goose-quill, sparsely puberulous, dark when dry. *Leaves* membranous, narrowly oblanceolate or lanceolate-oblong, acuminate or caudate-acuminate, much narrowed to the short petiole; both surfaces dark-brown when dry, glabrous, the midrib and 14 to 18 pairs of thin spreading nerves sometimes puberulous on the lower; length 4 to 8 or even 10 in.; breadth 1.5 to 3 in.; petiole .25 to .4 in.; stipules tubular below the 2-lobed mouth, slightly longer than the petioles. *Flowers* in fascicles of 4 to 6 (sometimes fewer), from the axils of fallen leaves, about .75 in. long, on stalks from .3 to .5 in. long. *Calyx* .5 in. long, narrowly campanulate, with dilated limb deeply divided into 5 narrow flexuose linear-lanceolate spreading lobes. *Corolla* slightly exceeding the calyx, tubular, glabrous except a pubescent band at the base of the interior of the tube; the mouth with 5 oblong obtuse lobes. *Anthers* 5, linear, sessile, at the base of the corolla-tube, .6 in. long. *Fruit* sub-globular, faintly ridged, glabrous, .5 to .75 in. in diam., crowned by the tentacle-like calyx-lobes. *Seeds* compressed, reticulate.

JOHOR: *Ridley* 11140; *Kelsall* 4082a. MALACCA: *Hervey*; *Maingay* (K.D.) 839; *Griffith* (K.D.) 2810; *Lobb*. PERAK: *Scortechini* 63; *King's Collector* 2691, 7851, 8377; *Wray* 2036. PENANG: *King's Collector* 1639, 2691. PAHANG: *Ridley* 2195.—DISTRIB. Borneo, *Motley* 934; *Beccari*; *Haviland* 2967.

2. *GARDENIA STENOPETALA*, King & Gamble n. sp. A shrub 4 to 8 feet high; young branches as thick as a goose-quill or nearly so, very dark-coloured when dry, covered with deciduous dark pubescence and minute white scales. *Leaves* large, thinly coriaceous, oblong-ob-lanceolate or elliptic, shortly acuminate, much narrowed to the short petiole; both surfaces olivaceous-brown when dry and both (but especially the lower) bearing sparse adpressed partly deciduous hairs, the midrib and nerves more densely pubescent; transverse veins on the lower rather distinct, distant; main-nerves 12 to 14 pairs, curved, ascending or spreading, rather bold on the lower surface when dry; length 7 to 14 in.; breadth 2 to 4 in.; petioles .3 to .5 in.; stipules shorter than the petioles, broadly triangular at the base, the apices long-acuminate. *Cymes* from the axils of fallen leaves, 2-branched and 4- to 6-flowered; their peduncles under .3 in. long, with narrowly linear, lanceolate bracts. *Flowers* 2.5 to 5 in. long; their pedicels .3 in., narrowly bracteate and rusty-pilose like the cyme-peduncles and calyx. *Calyx* narrowly campanulate, .4 to .6 in. long, the limb with 5 linear spreading lobes somewhat longer than the tube. *Corolla* with a puberulous cylindric tube about .5 to .75 in. long containing the 5 linear anthers at its base; lobes of the limb 5, narrow, 2.5 to 4.5 in. long and from .15 to .2 in. wide, with valvate inflexed edges, bearing some scattered hairs; *anthers* sessile, .3 in. long. *Style* filiform; stigma fusiform, shortly bifid. *Fruit* ovate-oblong, 2.5 in. long and 1.5 in. in diam., crowned by the persistent hairy calyx; pericarp thin, brittle, smooth; *seeds* ellipsoid, compressed, .3 in. long.

PERAK: *Scortechini* 1446; *King's Collector* 4156, 4265; *Curtis* 1306, 3144.

3. *GARDENIA CARINATA*, Wall. in Roxb. Fl. Ind. ed. Carey and Wall. II. 560. A shrub; young branches as thick as a goose-quill, whitish, glabrous, the cicatrices of fallen leaves prominent. *Leaves* membranous, obovate to oblanceolate, very shortly acuminate or cuspidate, much narrowed to the base; both surfaces brown when dry, the upper shining, glabrous except the midrib; the lower tinged olivaceous, puberulous especially on the stout midrib and 16 to 18 pairs of rather straight spreading stout nerves; length 4 to 7 in.; breadth 2 to 3 in. (sometimes much longer). *Flowers* 1.5 to 2 in. long, axillary, solitary or in pairs on short bracteolate puberulous pedicels. *Calyx*

1 to 1.25 in. long, campanulate. boldly 5-keeled, tapering to the pedicel, the mouth expanded sub-truncate or with 5 large deep-keeled lobes. *Corolla* salver-shaped; the tube .5 to 1 in. long, adpressed-puberulous, ridged; limb 1.25 to 2 in. across, with 6 to 9 broad lobes. *Stigma* broadly clavate. *Fruit* ellipsoid, 5- to 8-ribbed, 1.5 to 1.75 in. long including the large persistent calyx. Wall. Cat. 8271; Hook. fil. Fl. Br. Ind. III. 117. DC. Prod. IV. 380; Miq. Fl. Ind. Bat. II. 229.

PERAK: *Scortechini* 2301. PENANG: *Wallich*, *G. Curtis* 525. MALACCA: *Maingay* 1486, (K.D.) 837; *Ridley* 953, 906. *Hervey*. PROVINCE WELLESLEY: *Ridley* 6974. SINGAPORE: *H. J. Murton*.

4. *GARDENIA GODEFROYANA*, O. Kuntze in Revis. Gen. Pl. I. 283. Young branches half as thick as a goose-quill, rusty-puberulous, bearing at the nodes the persistent bases of the stipules. *Leaves* thinly coriaceous, dark-coloured when dry, both surfaces glabrous except for a few hairs near the edge and on the midrib, narrowly elliptic, the apex abruptly sub-acute, gradually narrowed to the base; main-nerves 8 to 10 pairs, indistinct on both surfaces; length 1.75 to 2.25 in.; breadth .65 to 1 in.; petiole .15 in.; stipules conjoined into a wide tube longer than the petioles, obliquely cut on one side, the apex acute rusty-pubescent externally. *Flowers* solitary or in pairs, 2 in. long. *Calyx* .5 in. long, infundibuliform; the mouth wide and with 5 short triangular keeled acuminate teeth with ciliate edges. *Corolla* about 1.5 in. long, widely campanulate, abruptly contracted into a cylindric tube .25 in. long, the limb 1.75 in. wide, divided into 5 deep oblong blunt spreading lobes. *Fruit* ellipsoid, crowned by the thick calyx-scar about an inch long and more than half an inch in diameter. *Seeds* numerous, compressed, surrounded by pulp.

PENANG: *Ridley* 1316.—DISTRIB. Saigon, *Pierre*; Cambodia, *Kuntze*; Cochin-China, *Godefroy-Leboeuf*.

5. *GARDENIA TUBIFERA*, Wall. in Roxb. Fl. Ind. ed. Carey & Wall. II. 562. An unarmed shrub or tree, young branches nearly as thick as a goose-quill, the bark very pale, glabrous, shining. *Leaves* thinly coriaceous, oblanceolate, the apex broad and shortly cuspidate, the base much narrowed; both surfaces pale olivaceous-brown, shining, usually glabrous, but sometimes the nerves and midrib beneath puberulous or scurfy; main-nerves 10 to 12 pairs, sub-horizontal, thin but distinct especially below; length 3 to 6 in.; breadth 1.5 to 2 in.; petiole .2 to .4 in., narrowly winged in its upper part; stipules tubular, sub-scarious, truncate, obscurely toothed, sometimes persistent, 2 in. long. *Flowers* solitary, axillary or terminal, glabrous, sub-sessile, 3 to 4 in. long. *Calyx* tubular, tapering slightly to the base, truncate, sometimes split at one side, smooth or ribbed, from .4 to .65 in. long.

Corolla thick, many times longer than the calyx; the tube 1·75 to 2·5 in. long, narrowly cylindric, slightly over ·1 in. in diam., pubescent at the throat, otherwise glabrous; the limb 2 to 2·5 in. across, spreading, deeply divided into 6 to 9 obovate or obovate-oblong lobes. *Anthers* inserted in the throat, half-exserted, linear, ·3 in. long. *Style* thick; stigma exserted, with 2 thick short lobes. *Fruit* globose or ovoid-globose, obscurely ridged or smooth, 1 to 1·5 in. in diam., crowned by the tubular calyx; endocarp thick, hard; seeds rather large. Wall. Cat. 8266; DC. Prodr. IV. 381; Hook. f. in Flor. Br. Ind. III. 117; Miq. Fl. Ind. Bat. II. 230; Schumann in Bot. Tidsskrift Kohn. XXIV. 333; Koord. & Valet. Bijdr. VIII. 99. *G. resinifera*, Korth. in Ned. Kruidk. Arch. II. 191; Kurz in Journ. As. Soc. Beng. 1876, II. 134 (*non* Roth). *G. glutinosa*, Teysm. & Binnend. in Herb. Lugd. Bat.

Three forms of this, founded on variations in the calyx, may be recognised as under:—

Form 1. Calyx obconical, smooth, ·4 to ·5 in long, truncate.

PERAK: *Scortechini* 1775; *King's Collector* 5260, 5581. JOHOR: *Kelsall* 4088. SINGAPORE: *Wallich*. PENANG: *Maingay* (K.D.) 838. MALACCA: *Maingay* (K.D.) 838; *Griffith* (K.D.) 2816; *DISTRIB.* Sumatra, *Forbes* 3222; Borneo, *Motley* 341; *Beccari* 3250; Koh Chang in Siam; Java, *Teymann*.

Form 2. Calyx-tube ribbed, ·4 to ·5 in. long.

PERAK: *Wray* 2522; *King's Collector* 6285. PENANG: *King's Collector* 1474; *C. Curtis* 686. SINGAPORE: *Cantley* 215; *Ridley* 2588, also *Lobb* 125.

Form 3. Calyx tubular, smooth, ·5 to ·65 in. long, split on one side.

JOHOR: *King's Collector* 11139. PAHANG: *Ridley* 375, 1388(?) The Johor specimen is well-marked, the other more doubtful.—*DISTRIB.* Borneo, *Curtis* 111.

6. *GARDENIA SPECIOSA*, Hook. fil. Fl. Br. Ind. III. 117. A glabrous tree 40 to 60 feet high; young branches much thicker than a goose-quill, pale, marked by the annular scars of the stipules. *Leaves* coriaceous, obovate or oblanceolate-elliptic, shortly and abruptly acuminate, or cuspidate, the base much narrowed; both surfaces pale olivaceous-brown, glabrous except for some slight pubescence on the midrib and nerves; main-nerves 12 to 14 pairs, slightly curved, depressed on the upper but prominent on the lower surface as is the midrib; length 4 to 6 in.; breadth 1·5 to 3 in.; petiole ·5 to 1 in.; stipules tubular-sheathing, the mouth irregularly toothed. *Flowers* 4 to 6 in. long, coriaceous, solitary or in pairs, axillary, sessile. *Calyx*

.75 to 1.5 in. long, inflated-tubular, the mouth oblique, irregularly few-lobed. *Corolla-tube* cylindric, 3 to 3.5 in. long and about .15 in. in diam. when dry; limb 2.5 to 3 in. across with 6 to 9 deep obovate-elliptic, blunt lobes. *Anthers* inserted in the villous throat, linear, .4 in. long, half-exserted. *Fruit* globular, not ridged, 1.5 in. in diam., surmounted by the persistent tubular calyx-tube .75 to 1 in. long. *Randia speciosa*, Hook. Ic. Pl. t. 824.

SINGAPORE: *Lobb.* PERAK: *Wray* 4265; *King's Collector* 4516, 5830, 8736, 10180.

7. GARDENIA GRIFFITHII, Hook. fil. Fl. Br. Ind. III. 118. A large shrub or small tree; young branches as thick as a goose-quill with pale bark marked by the annular cicatrices of the stipules, glabrous. *Leaves* thickly coriaceous, obovate-elliptic, cuspidate, much narrowed to the short petiole; upper surface olivaceous-brown, glabrous, shining, with the reticulations transverse and depressed; lower surface brown, puberulous especially on the stout midrib and 12 to 15 pairs of oblique slightly curved distinct main-nerves; length 5 to 9 in.; breadth 2.5 to 4 in.; petioles .3 to .4 in., stout, winged; stipules .35 to .4 in. long, with expanded irregularly toothed mouths. *Flowers* solitary, terminal or axillary, sessile, 4 to 4.5 in. long. *Calyx* nearly as long as the corolla-tube, coriaceous, tubular, expanding upwards, the mouth irregularly toothed, undulate, oblique, .75 in. in diam., glabrous. *Corolla* salver-shaped, the tube cylindric, much narrower than the calyx; limb 3 in. across, with many lobes, imbricate in aestivation. *Fruit* woody, globular, when dry with slender vertical striæ, glabrous, 2 in. in diam., crowned by the very long, persistent calyx.

MALACCA: *Griffith* (K.D.) 2821; *Ridley* 223; *Derry* 1045. SINGAPORE: *Ridley* 6673; *Hullett* 611, 896.

VAR. *Maingayi*, Hook. fil. l.c. Mouth of the calyx irregularly cut into triangular coriaceous teeth.

MALACCA: *Maingay* (K.D.) 841.

27. PETUNGA, DC.

Glabrous shrubs or small trees with slender often 4-angled branches. *Leaves* petioled, narrowed to base and apex; stipules triangular or ovate-oblong. *Flowers* small, white, bi-bracteolate, in axillary spikes. *Calyx-tube* campanulate, with a persistent 4-lobed limb. *Corolla* funnel-shaped, its throat villous, the limb with 4 spreading lobes; lobes twisted in bud. *Anthers* 4, sub-sessile, linear, the connective thickened at the apex. *Ovary* 2-celled, but often incompletely so; style cylindric, with stoutly linear hairy stigmatic branches; ovules 2 to 8, pendulous from the apex of each cell. *Fruit* small, 2-celled. *Seeds*

imbricate; testa thick, grooved, rugulose; cotyledons linear.—DISTRIB. 4 or 5 species in Malaya and Northern India.

Rachis and bracteoles of the raceme, the calyx corolla and fruit externally and the midrib and main-nerves of the leaves beneath pubescent ... 1. *P. longifolia*.

Rachis and inflorescence glabrous, except the bracteoles and edges of the calyx-lobes:—

Fruit ellipsoid to ovoid, .2 to .25 in. long, its pedicel short; leaves narrowly oblong-lanceolate to lanceolate ... 2. *P. Roxburghii*.

Fruit clavate .5 to .75 long, mammillate at the apex, not ridged; leaves broadly elliptic-oblong ... 3. *P. venulosa*.

1. *PETUNGA LONGIFOLIA*, DC. Prod. IV. 399. A small tree; young branches almost as thin as a crow-quill, 4-angled, cinereous-puberulous at first, afterwards glabrous. *Leaves* membranous, oblong-elliptic, much tapered to both ends, glabrous except the midrib and main-nerves on the lower surface; both surfaces olivaceous-brown when dry; the lower conspicuously and transversely reticulate; main-nerves 6 to 8 pairs, slightly curved, ascending, thin but prominent on the lower surface, obsolete on the upper; length 4 to 5.6 in.; breadth 1.25 to 1.5 in.; petioles about .35 in., decidedly puberulous; stipules broadly triangular, acuminate, the midrib hairy, .2 in. long. *Racemes* at first not much longer than the petioles but afterwards lengthening much. *Flowers* .2 in. long, the pedicels at first very short but lengthening in fruit from .2 to .35 in., pubescent like the triangular bracteoles. *Calyx* funnel-shaped, less than .1 in. long, its mouth with 4 broad acute teeth. *Corolla* more than twice as long as the calyx, funnel-shaped, 4-lobed. *Fruit* clavate, crowned by the small calyx-limb, about .3 in. long when ripe, puberulous, the pedicel usually longer. Koord. & Valet. Bijdr. 8. 114. *Higginsia longifolia*, Blume MSS.

PENANG: *Phillips*, Wall. Cat. 8301a.; *Curtis* 2476, 2839; *Ridley* 10238; *King's Collector* 1447. PERAK: *Wray* 863, 1350; *Scortechini*; *King's Collector* 470, 4567, 7700; *Curtis* 3143 (in part). PAHANG: *Ridley* 2194.—DISTRIB. Sumatra.

This differs from *P. Roxburghii* in having all parts of the inflorescence hairy, and in having differently shaped fruits on long pedicels. It has also broader leaves, the under surfaces of which are pubescent on the midrib, main-nerves and conspicuously transverse reticulations.

2. *PETUNGA ROXBURGHII*, DC. Prod. IV. 399. An evergreen much-branched shrub 3 to 8 feet high; young branches 4-angled, cinereous when dry, thicker than a crow-quill. *Leaves* thinly coriaceous, oblong-lanceolate to lanceolate, tapering equally to each end; upper surface

olivaceous-brown, not reticulate; the lower rather darker faintly reticulate; main-nerves 8 to 10 pairs, spreading, faint on both surfaces; length 2.5 to 5 in.; breadth .75 to 1.5 in.; petiole .1 to .2 in., stipules about one-third of the length of the leaves. *Racemes* more than 1 in. long, but shorter than the leaves, slender, glabrous. *Flowers* .25 in. long, with several bracteoles at their bases. *Calyx* funnel-shaped, the limb with 4 broad triangular lobes. *Corolla* salver-shaped, glabrous except the villous throat; the mouth with 4 broadly oblong obtuse reflexed lobes. *Anthers* partly exserted from the throat. *Style* with two thick hairy arms. *Fruit* elliptic to ovoid, .2 to .25 in. long, glabrous, surmounted by the small calyx-limb; the pedicels very short. Hook. fil. Fl. Br. Ind. III. 120. *P. microcarpa*, DC. Prod. IV. 399. *P. variabilis*, Hassk. in Flora 1845, 232. *Higginsia microcarpa*, Blume Bijdr. 988. *Spicillaria Leschenaultii*, A. Rich. in Mem. Mus. Hist. Nat. Paris V. 252. *Randia racemosa* and *R. polysperma*, Roxb. Hort. Beng. 15; Fl. Br. Ind. I. 525, 527. *R. polysperma*, DC. l.c. 389. *Hypobathrum racemosum*, Kurz. For. Fl. Burm. II. 51. *Rubiacea*, Wall. Cat. 8302, 8312.

PERAK: *Curtis* 3143 (in part); *King's Collector* 1385, 2900; *Scortechini* 335, 1093. PENANG: *Curtis* 3387. PANGKOR: *Curtis* 1387. SINGAPORE: *Ridley* 1990. MALACCA: *Griffith*, *Ridley* 230. SELANGOR: *Ridley* 3187.—DISTRIB. Northern India; Burma; Java; Sumatra; Borneo.

VAR. *floribunda*. *Racemes* longer than the leaves, flowers very numerous; a tree.

PERAK: *King's Collector* 10023. JOHOR: *Ridley* 11157. SELANGOR: *Ridley* 3187.

It is probable that this should rank as a species.

3. PETUNGA VENULOSA, Hook. fil. Fl. Br. Ind. III. 121. All parts glabrous; young branches thicker than a crow-quill, somewhat compressed, shining, dark-coloured when dry. *Leaves* coriaceous, elliptic-oblong, shortly and rather abruptly acuminate, cuneate or rounded and sometimes slightly oblique at the base; both surfaces warm-brown when dry; main-nerves 6 or 7 pairs, slightly curved, ascending, thin but prominent on the lower surface like the midrib, and depressed on the upper; length 3 to 6 in.; breadth 1.5 to 3 in.; petioles .2 to .3 in.; stipules triangular, acuminate, keeled, as long as the petioles. *Racemes* at first only about 1 in. long, afterwards much longer. *Flowers* .35 in. long, on short pedicels with one or two ovate-acute bracteoles at their bases. *Calyx* less than .1 in. long, campanulate, the mouth with 4 broad blunt lobes hairy at the edge. *Corolla* .3 in. long, funnel-shaped, the throat densely pubescent, otherwise glabrous, the limb

with 4 ovate-acute reflexed lobes. *Anthers* oblong, apiculate, partially exserted. *Style* with 2 thick hairy arms. *Fruit* clavate, slightly mammillate at the apex and much narrowed at the base when ripe, .5 to .75 in. long and .2 to .25 in. in diam. at the middle; pericarp leathery, endocarp woody.

PENANG: 8301 (in part); *Curtis* 762, 3386; *King's Collector* 1332. MALACCA: *Griffith* (K.D.) 2829; *Maingay* (K.D.) 911; *Holmberg* 774; *Derry* 1116. SINGAPORE: *Ridley* 8427. PERAK: *Wray* 500, 2315, 2487, 3386; *Ridley* 7183; *King's Collector* 1332, 2594, 3156; *Scortechini* 141, 1411.

The fruits of this species are often attacked by an insect and become .5 to 1.75 in length and .4 in. in diam. These galled-fruits are fusiform in shape and have 6 or 7 sharp vertical ridges and their apices are crowned by the slender much elongated calyx-tubes. They are moreover borne on peduncles nearly as long as themselves.

28. DIPLOSPORA, DC.

Shrubs or trees with shortly petiolate coriaceous leaves and triangular acuminate stipules. *Flowers* small, in axillary fascicles or small cymes, polygamo-dioecious, greenish or white; bracts free or connate in a cup. *Calyx* with short tube and truncate 4- or 5-toothed or -lobed limb. *Corolla* cylindric-campanulate or salver-shaped; the limb with 4 or 5 spreading lobes twisted in bud. *Stamens* 4 or 5, inserted by long or short filaments on the throat of the corolla; anthers oblong or linear, exserted, sub-basifixed, often recurved. *Ovary* 2-, rarely 3-celled. *Style* long or short, its branches linear or oblong; ovules 2 or 3 in each cell; placentas on the septum. *Berry* ovoid or globose; seeds few in each cell, imbricate; embryo small.—DISTRIB. Species about 16; tropical Asiatic and Malayan.

All parts quite glabrous:—

Leaves broadly elliptic, 6 or 7 in. long; fruit ovoid,
 .85 in. long 1. *D. Beccariana*.

Leaves narrowly elliptic, 2.25 to 4.5 in. long; fruit
 fusiform 2. *D. malaccense*.

Nerves and midrib of leaves pubescent or puberulous on
 the lower surface:—

Leaves 6 to 11 in. long:—

Leaves shortly caudate-acuminate, main-nerves 7
 or 8 pairs; young branches deciduously pubescent 3. *D. Wrayi*,

Leaves with long narrow apical tail; main-nerves
 10 to 12 pairs; young branches cinereous-tomen-
 tose 4. *D. velutina*.

Leaves usually under 6 in. in length:—

Leaves oblanceolate, their main-nerves 8 to 10
 pairs; petioles .35 to .4 in. long ... 5. *D. Kunstleri*.

Leaves narrowly elliptic or elliptic-oblong, not
oblancoolate, their main-nerves 6 or 7 pairs; petioles

·15 to ·2 in. long	...	...	6. <i>D. pubescens</i> .
Imperfectly known species	...	...	7. <i>D. n. sp.?</i>

1. *DIPLOSPORA BECCARIANA*, King & Gamble n. sp. A glabrous tree 30 to 40 feet high; young branches compressed, thinner than a goose-quill. *Leaves* coriaceous, broadly elliptic, shortly and bluntly cuspidate, the base broad, rounded and slightly unequal; both surfaces pale olivaceous-brown when dry, shining (the lower the paler), with wide faint reticulations; main-nerves about 7 pairs, much curved, ascending, thin but distinct on both surfaces; length 6·5 to 7·5 in.; breadth 3·25 to 3·75 in.; petioles ·5 in.; stipules triangular, sub-acute, only ·15 in. long. *Flowers* not seen. *Fruit* ovoid, mammillate at the apex and tapered to the base, smooth, several-seeded; length ·85 in., breadth about ·2 in. when dry.

PERAK: *King's Collector* 6408.

A species badly represented in the Calcutta collections. It appears to be the same as Beccari's Bornean (Sarawak) plant Nos. 300 and 2062 and we have associated it with the name of that distinguished botanist and explorer.

2. *DIPLOSPORA MALACCENSIS*, Hook. fil. in Fl. Br. Ind. III. 124. A small tree; all parts quite glabrous; young branches rather thicker than a crow-quill, cinereous, glabrous. *Leaves* narrowly elliptic, shortly abruptly and obtusely acuminate, more or less narrowed at the base; upper surface brown when dry, the lower very pale-olivaceous; main-nerves 4 or 5 pairs, faintly prominent on the lower surface and slightly depressed on the upper; length 2·5 to 4·5 in.; breadth 1 to 2 in.; petioles ·15 to ·2 in.; stipules shorter than the petioles. *Flowers* ·2 in. long, in small clusters in the axils of fallen leaves; their pedicels short, bracteolate at the base, usually (*vide* Hook. fil.) unisexual. *Calyx* shorter than the corolla, tubular-campanulate, the mouth with 4 broad, coriaceous, acute teeth. *Corolla* thin, tubular, cut half-way down into 4 blunt oblong lobes. *Anthers* 4, narrowly ovate, sessile, half-exserted from the throat. *Fruit* fusiform, surmounted by the calyx, glabrous. *Lachnostoma triflorum*, Korth. in Ned. Kruidk. Arch. II. 202; Miq. Fl. Ind. Bat. II. 257.

In all the provinces; common.

3 *DIPLOSPORA WRAYI*, King & Gamble n. sp. A shrub or small tree; young branches half as thick as a goose-quill, cinereous, covered like the stipules and petioles with minute deciduous cinereous pubescence; all other parts save the interior of the corolla-tube glabrous. *Leaves* elliptic or elliptic-oblong, often somewhat obovate, shortly caudate-acuminate, the base cuneate; both surfaces pale

olivaceous-green when dry, the lower the paler; main-nerves 7 or 8 pairs, curved, ascending, thin but prominent on the lower surface, faint on the upper; length 6 to 11 in.; breadth 2.5 to 4.75 in.; petioles .25 to .4 in.; stipules shorter than the petioles, broadly ovate, acuminate, keeled. *Flowers* .25 in. long, in dense shortly peduncled or sessile axillary minutely bracteolate fascicles a little longer than the petioles. *Calyx* very short, cupular, with 4 broad shallow teeth. *Corolla* tubular, slightly inflated above the middle; the tube villous inside; the lobes of the limb shorter than the tube, glabrous, imbricate, oblong, sub-acute. *Anthers* sessile in the tube .1 in. long oblong. *Style* cylindric, as long as the corolla, divided into 2 linear hairy arms; ovary with 2 bi-ovulate cells. *Fruit* globular-ovoid, crowned by the faint scar of the calyx, glabrous, .4 in. long, and about .3 in. in diam.

PERAK: Wray 60, 2879, 3469; Ridley 5544; King's Collector 2366, 2697, 2782, 5277, 6253.

This closely resembles specimens in Herb. Kew. named *Vangueria palembanica* Teyssm. & Binn. which is a *Diplospora*.

4. *DIPLOSPORA VELUTINA*, King & Gamble n. sp. A small tree; young branches half as thick as a goose-quill, densely covered with short dark-cinereous tomentum like the stipules and petioles. *Leaves* coriaceous, oblong-elliptic, sometimes slightly obovate, the apex abruptly contracted into a narrow acute point about 1 in. long, the base rounded or slightly narrowed; upper surface glabrous, shining, the midrib and main-nerves depressed; the lower with bulbous-based hairs in the interspaces between the nerves; main-nerves 10 to 12 pairs, slightly curved, ascending, stout, the latter as well as the bold midrib and transverse curved veins very pubescent; length 8 to 10 in.; breadth 3 to 4.5 in.; petioles about .2 in.; stipules about as long as the petioles, keeled, triangular, very acuminate. *Flowers* .25 in. long, sessile, in dense sessile axillary heads not much longer than the petioles. *Calyx* very short, cupular, obscurely lobed. *Corolla* funnel-shaped, glabrous except the densely villous throat; the limb with 4 oblong, broad, slightly emarginate lobes. *Anthers* sagittate. *Style* slender, with 2 short, linear, compressed stigmatic lobes. *Fruit* unknown.

PERAK: King's Collector 3142.

5. *DIPLOSPORA KUNSTLERI*, King & Gamble n. sp. A small tree; young branches thinner than a goose-quill, deciduously puberulous like the stipules, petioles, and lower surfaces of the midrib and main-nerves, otherwise glabrous. *Leaves* sub-coriaceous, oblanceolate to elliptic or oblong, shortly, abruptly, and bluntly acuminate, the base rounded or slightly cuneate; both surfaces of rather a dark-brown

when dry; the midrib impressed on the upper, prominent on the lower; main-nerves 8 to 10 pairs, oblique, little curved, prominent beneath; veins transverse, thin but distinct on the lower surface; length 6 or 7 in.; breadth 1.75 to 2.5 in.; petioles .35 to .4 in. long; stipules about as long as the petioles, triangular-lanceolate, keeled, produced into a long narrow point. *Cymes* small, shortly peduncled, axillary. *Flowers* not seen. *Fruit* mamillate when young, ovoid and crowned by the small calyx-scar when ripe, smooth, .4 in. long; 2-celled, 2-seeded.

PERAK: *Scortechini* 298; *King's Collector* 3211.

6. *DIPLOSPORA PUBESCENS*, Hook. fil. Fl. Br. Ind. III. 124. A shrub; young branches thicker than a crow-quill, compressed, minutely pubescent like the stipules and petioles. *Leaves* coriaceous, narrowly elliptic or elliptic-oblong, shortly and obtusely caudate-acuminate, the base cuneate; both surfaces when dry pale-brown, the upper everywhere glabrous and the midrib and main-nerves channelled; the lower glabrous between the minutely pubescent stout midrib and 6 or 7 pairs of slightly curved slender but prominent main-nerves; length 3 to 6 in.; breadth 1.25 to 2.25 in.; petioles .15 to .2 in.; stipules about as long as the petioles, narrowly lanceolate, tapering into long subulate points. *Flowers* about .2 in. long, in dense short axillary sub-sessile heads slightly longer than the petioles. *Calyx* short, with 4 very small blunt lobes, pubescent. *Corolla* longer than the calyx, tubular, lobes of limb 4, short, the throat villous. *Fruit* ovoid-globular, smooth, the calyx scar small; length .4 in.; seeds 4. Wall. Cat. 8297.

PERAK: *Scortechini* 6, 94; *Ridley* 5537.—DISTRIB. Mergui, *Griffith* 1108; *Helfer* (Kew. Dist. 2799).

Imperfectly known species.

7. *DIPLOSPORA*, n. sp.? Young branches thicker than a crow-quill, densely and minutely cinereous-pubescent. *Leaves* coriaceous, narrowly elliptic, shortly and somewhat bluntly caudate-acuminate, the base slightly narrowed; both surfaces dark-brown when dry; the upper shining, glabrous, lower dull, puberulous on the bold midrib and 6 or 7 pairs of prominent oblique little curved main-nerves; length 4.5 to 5.5 in.; breadth 1.5 to 2.35 in.; petioles .15 to .2 in.; stipules about as long as the petioles, triangular, sub-acute or acute but not acuminate. *Flowers* not seen. *Fruit* ovoid-globular, crowned by the small calyx-scar, smooth, .45 in. long, and .35 in. in diam.

PERAK: at an elevation of 5,000 feet; *Wray* 4086.

29. *SCYPHIPHORA*, Gaertn.

A small tree with stout terete nodose branches, gum-yielding when young; all parts except the inside of the corolla-tube glabrous.

Leaves coriaceous, obovate, obtuse; stipules short, broad. *Flowers* small, in dense, shortly-pedunculate cymes. *Calyx-tube* elongate-obconic; the limb cupular, truncate, minutely 4- or 5-toothed, persistent. *Corolla-tube* cylindric; the throat dilated and villous; the limb with 4 or 5 oblong lobes twisted in bud. *Stamens* 4 or 5, inserted by short filaments between the lobes of the corolla, anthers linear, sagittate. *Disk* annular, lobed. *Ovary* with 2 narrow cells; style filiform, with 2 linear obtuse stigmatic branches. *Ovules* 2 in each cell, attached to the middle of the cell, one pendulous, the other ascending; the contiguous funicles dividing each cell into 2 chambers. *Drupe* sub-cylindric, 8- to 10-grooved and winged, separating into 2 crustaceous 4- to 5-ribbed pyrenes. *Seeds* sub-cylindric; testa membranous; albumen scanty; cotyledons oblong.—**DISTRIB.** A single species in Malaya and Ceylon.

SCYPHIPHORA HYDROPHYLLACEA, Gaertn. Fruct. III. 91. t. 196. A miniature evergreen tree, with a spherical crown and simple stem hardly exceeding 4 feet in height. *Leaves* acute at the base on a petiole .5 to 1 in. long; nervation obsolete; length about 2 in.; breadth 1.5 in. *Flowers* whitish often tinged with red; collected in small dichotomously branched axillary cymes. *Calyx* about .15 in. long. *Corolla-tube* about as long as the calyx and its lobes half as long. *Drupe* elliptically oblong, about .35 in. long. DC. Prod. IV. 577; Kurz. Fl. Burm. II. 4; Hook. fil. Fl. Br. Ind. III. 125; Miq. Fl. Ind. Bat. II. 239; Koord. & Valet. Bijdr. 8. 125; Trimen Fl. Zeyl. III. *Epithenia malayana*, Jack in Mal. Misc. I. 12; Wall. Cat. 8444; DC. l.c. 478; W. & A. Prod. 424. *Epithenia* sp., Griff. Notul. IV. 269; Ic. Pl. Asiat. 478 and 644 A. (*Lumintzera*). *Rubiacea*, Wall. Cat. 9055 A. in part.

In Mangrove swamps.—**DISTRIB.** Coasts of S. India and Ceylon; Andaman Islands; Malay Archipelago to N. Australia; Philippines and New Caledonia.

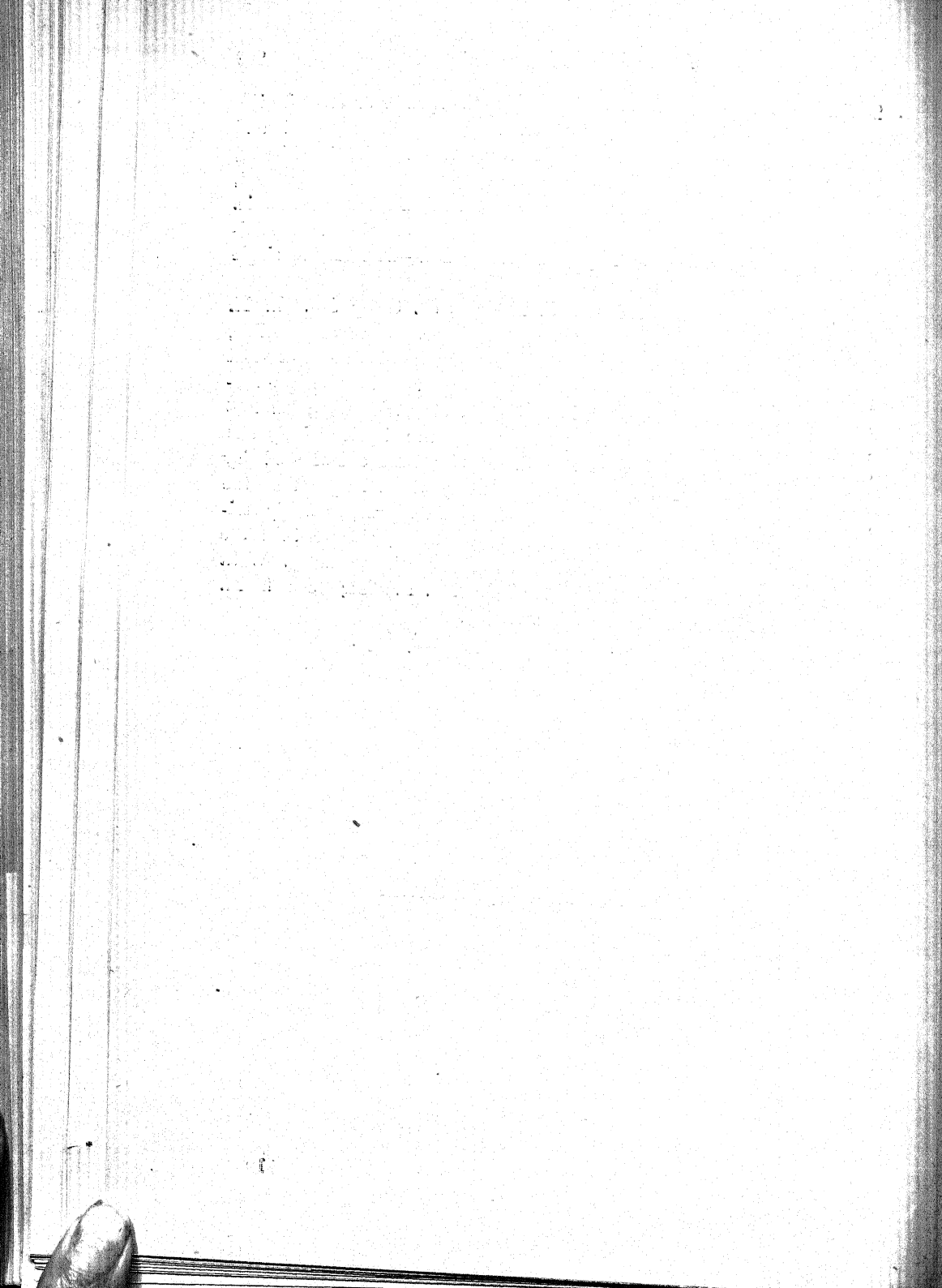
30. JACKIA, Wall.

A tall tree; young branches stout, obtusely 4-angled, covered by the persistent bases of the fallen leaves and by the large coriaceous, sheathing long-bristled stipules. *Leaves* coriaceous, large. *Flowers* densely pubescent, in prominently bracteolate scorpioid cymes arranged corymbosely in long-peduncled pendulous axillary panicles. *Calyx-tube* small, obconic, the limb with 5 unequal lobes, two of them small the other 3 coriaceous, large, veined, accrescent and forming wings to the ripe fruit. *Corolla* funnel-shaped, the tube narrow, sub-glabrous inside, lobes of the limb 5, valvate in bud, triangular. *Anthers* 5, linear, sub-sessile in the throat, the connective apiculate. *Disk* hairy. *Ovary*

2-celled, ovules 2 in each cell, attached to the apex of an erect basilar placenta. *Style* compressed, slender, long-exserted, thickened and hairy about the middle, stigmatic-lobes 2, short. *Fruit* dry, indehiscent, obconic, .1 in. long, densely hairy, crowned by 3 accrescent, persistent, veined, oblong somewhat oblanceolate blunt calyx-lobes about .6 in. long; *seeds* (by abortion) solitary, ellipsoid, embryo straight in the axis of much fleshy albumen; cotyledons broad, flat.—DISTRIB. A single Malayan species.

JACKIA ORNATA, Wall. in Roxb. Fl. Ind., ed. Carey & Wall. II. 321. Young branches as thick as the little finger. *Leaves* oblanceolate, the apex sub-acute, narrowed from above the middle to the short stout petiole; upper surface glabrous and shining, the lower adpressed-puberulous; main-nerves about 12 pairs, prominent beneath; length 6 to 12 in.; breadth 2.5 to 5 in.; petiole .4 to .9 in.; stipules widely and deeply cupular, often 1 inch or more in length (to the end of the hairy bristles). *Flowers* .4 in. long; corolla many times longer than the calyx-tube, twice as long as the calyx-lobes when young, densely sericeous externally; bracteoles broadly oblong-ovate, shorter than the flowers, imbricate, sericeous, the lower ones sometimes connate. Wall. Pl. As. Rar. t. 293; Wall. Cat. 6284; DC. Prod. IV. 621; Hook. fil Fl. Br. Ind. III. 126; Miq. Fl. Ind. Bat. II. 237.

In all the provinces.—DISTRIB. Malay Archipelago.



32391

MATERIALS

FOR A

FLORA OF THE MALAYAN PENINSULA

BY

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LATE SUPERINTENDENT OF THE ROYAL BOTANIC GARDEN, CALCUTTA,

AND

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No. 15.

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1904.

Materials for a Flora of the Malayan Peninsula.—By Sir GEORGE KING,
K.C.I.E., LL.D., F.R.S., late Superintendent of the Royal Botanic
Garden, Calcutta, and JAMES SYKES GAMBLE, Esq., C.I.E., M.A.,
F.R.S., late of the Indian Forest Department.

No. 15.

[Read March 2nd, 1904.]

In the last of these contributions thirty genera of *Rubiaceae* were described. In the present one descriptions are given of the twenty-three remaining genera. Our account of the species of *Psychotria* ought to have been included here. But, owing to an unfortunate circumstance, it has been necessary to keep it back for publication in the next paper of the series. In the accompanying key to the genera, *Psychotria* is however included. The species described in the present paper number 123, and of these 47 are believed to be new.

Ovary 2-celled with 2 ovules in each cell, or imperfectly 4-celled with 1 ovule in each cell, always pendulous from about the middle of the septum; calyx-limb truncate; drupe with 2 or 4 pyrenes; flowers umbellate; corolla-lobes narrow, valvate in bud; scandent shrubs

... 31. COBLOSPERMUM.

Ovules solitary in each cell; ovary 2- to many-celled:—

Radicle superior:—

Ovules pendulous from the apex of the cell:—

Fruit composed of several cohering woody pyrenes; stamens inserted on the mouth of the corolla-tube:—

Pyrenes 4 to 9: corolla imbricate, calyx-limb deciduous: shrubs or trees

... 32. GUETTARDA.

Pyrenes 12 to 24: corolla valvate; calyx-limb persistent, cupular: shrubs or trees

... 33. TIMONIUS.

Fruit 2-celled, consisting of 2 dry small indehiscent cocci; herbs with connate setaceous stipules

... 34. KNOXIA.

Ovules pendulous from the septum near its apex:—

Drupe with 2 free or cohering pyrenes; trees or shrubs with axillary inflorescence:—

Stipules equal: shrubs (often climbing); drupe didymous and 2-seeded or sub-globose and (by abortion) 1-seeded; seeds oblong

... 35. CANTHIUM.

Stipules unequal, (one very large); seeds cup-shaped; a tree

36. MESOPTERA.

Radicle inferior:—

Ovules on the septum of the ovary:—

Corolla-lobes imbricate in bud:—

Ovary 2-celled, each cell with an ovule on the middle of the septum; flowers ebracteate, in small supra-axillary clusters, 5-merous; calyx-lobes as long as the tube, thickened and persistent, stamens 5, inserted near the base of the corolla-tube; style short; stigma fusiform; fruit boldly 10-ridged; a shrub

37. GARDENIOPSIS.

Corolla-lobes twisted in bud:—

Ovary 2-celled, each cell with one ovule (in one species with 2 ovules); flowers 5-merous; style short, pubescent; stigmas stout and grooved; fruit with scanty pulp; seeds plano-convex, often cupped

38. WARRERA.

Ovary 2-celled, each cell with one ovule inserted near the middle of the cell, not basilar; flowers 4-merous (5-merous in one species of *Ixora*); style long, slender, glabrous, exserted; stigmas slender, smooth; fruit globose or didymous with leathery or pulpy pericarp; pyrenes 2, coriaceous, each with a single plano-convex seed:—

Style exserted but never twice as long as the corolla-tube; stigma thicker than the style, bifid: stipules and bracts of the inflorescence coriaceous, usually small, the latter not sheathing; leaves usually coriaceous

39. IXORA.

Style very slender much longer (often twice as long) than the corolla-tube; stigma not thicker than the style (sometimes thinner), usually entire; stipules and bracts of the inflorescence large and membranous (the latter sheathing); leaves membranous

40. PAVETTA.

Corolla-lobes valvate in bud:—

Stamens 4 or 5, usually inserted on the mouth of the corolla (rarely in the tube); ovules usually inserted below (rarely above) the middle of the septum, amphitropous; fruit a 2- or 4-celled berry or a drupe with 2 or 4 pyrenes; trees or shrubs, (sometimes scandent):—

Flowers united by their calyx-tube into more or less fleshy heads:—

Heads many-flowered, ovoid, solitary or in axillary or terminal umbels or panicles; seeds obovoid or reniform

41. MORINDA.

Heads few-flowered, sub-spicate in
terminal panicles; seeds thin, orbicu-
lar

42. *RENNELLIA*.

Flowers free:—

Flowers unisexual:—

Calyx-limb cupular; throat of corolla
glabrous, stamens included in its tube;
flowers terminal and axillary; berry 1-
to 2-seeded; seeds sub-globose, peltate
Calyx-limb annular, truncate, entire or
5-toothed; throat of corolla woolly and
bearing the stamens; flowers in axillary
heads; drupe globose; seeds com-
pressed

43. *PRISMATOMERIS*.

44. *GYNODHODES*.

Flowers bisexual:—

Calyx-limb truncate, entire or obscurely
lobed; throat of corolla glabrous or
hairy; flowers in umbels; fruit a berry
or drupe with 2 to 4 pyrenes; seeds
obscurely trigonous

31. *COELOSPERMUM*.

Stamens 4, inserted on the throat of the corolla;
style filiform; stigma capitate or bifid; ovules
inserted on the middle of the septum; fruit a
crustaceous or coriaceous deliscent mericarp;
seeds oblong or ovoid with ventral groove;
herbs

45. *SPERMACOCE*.

Ovules basilar, erect:—

Corolla-lobes inflexed-valvate in bud:—

Stamens 4 or 5, inserted in the corolla-tube;
style-arms 2, twisted; fruit capsular, com-
pressed or globular, containing 2 dorsally com-
pressed,—winged or cupped pyrenes often pendu-
lous from a columella; seeds compressed, the
testa membranous; foetid climbing shrubs

46. *PAEDERIA*.

Corolla-lobes valvate in bud; stamens usually 4,
but sometimes 5 to 7, inserted near mouth of the
corolla; ovules cuneate, anatropous; drupe with 2
or more pyrenes:—

Flowers axillary and terminal, solitary or in
small fascicles; anthers 4, sub-sessile:—

Calyx-limb dilated, unequally 4- to 6-lobed;
drupe with 2 pyrenes; foetid terrestrial
shrubs

47. *SAPROSMA*.

Calyx-limb truncate; drupe with 2 pyrenes;
epiphytes with tuberos honey-combed stems

48. *HYDNOPHYTUM*.

Flowers solitary, capitate or fascicled, axillary
or terminal:—

Flowers solitary; calyx with 4 rather long

- lobes; stamens 4 to 7; creeping herbs often with cordate leaves ... 49. *GEOPHILA*.
- Flowers numerous, in heads surrounded by many large thick involucre; calyx-limb entire; style-arms 2; stamens 4 or 5 ... 50. *CEPHAELIS*.
- Flowers in axillary fascicles or condensed cymes, calyx-limb 3- to 6-fid or entire and truncate; stamens 4 to 6; style-arms 3 to 9; leaves distichous, not cordate; pyrenes 3 to 9 ... 51. *LAMIANTHUS*.
- Flowers in terminal (rarely axillary) corymbose or paniced, rarely capitate, never involucre cymes:—
- Calyx-limb short, 4- or 5-toothed; corolla-tube usually long and curved; seeds orbicular, very concave on the ventral surface ... 52. *CHASALIA*.
- Calyx-limb short, 4- to 6-toothed; corolla-tube usually short, straight; seeds plano-convex ... 53. *PSYCHOTRIA*.*

31. *COELOSPERMUM*, Blume.

Scandent glabrous shrubs; the young branches often compressed. *Leaves* coriaceous, elliptic, oblong or obovate, with few and indistinct nerves; stipules short, broad, connate below, acute or bifid at the apex, caducous and leaving an annular scar on the branch. *Flowers* in 3-6-flowered paniced umbels. *Calyx-tube* short, campanulate or hemispheric; the limb membranous, truncate or obscurely lobed, sometimes deciduous. *Corolla* coriaceous, clavate in bud, funnel-shaped or salver-shaped; the limb with 4 or 5 linear-oblong or lanceolate, sub-acute, patent or reflexed lobes longer than the tube, in bud valvate, the edges and apices often recurved. *Stamens* 4 or 5, on the throat of the corolla; filaments slender; anthers linear, versatile; exerted. *Ovary* 2-celled or imperfectly 4-celled; style filiform; stigmas 2, linear-lanceolate. *Ovules* 2 in each cell in the 2-celled species and 1 in each cell in the 4-celled species, on fleshy placentas. *Fruit* depressed-globular, dry or fleshy, containing 2 or 4 pyrenes.—*DISTRIB.* Malaya and Australia—about 10 species.

- Limb of calyx membranous, deciduous: cells of ovary 2, each with 2 or more ovules ... 1. *C. truncatum*.
- Limb of calyx coriaceous, permanent: cells of ovary 4, cells uni-ovulate ... 2. *C. scandens*.

1. *COELOSPERMUM TRUNCATUM*, King & Gamble. A shrubby glabrous creep: youngest branches thinner than a goose-quill, pale-brown,

* The descriptions of the species of this genus will be printed in No. 16 of the present series of papers.

terete. *Leaves* coriaceous, elliptic-oblong, or sub-obovate, shortly and rather obtusely acuminate, the base cuneate; both surfaces (when dry) dark-brown with a tinge of olivaceous, dull; the midrib depressed on the upper, prominent on the lower; main-nerves about 4 pairs, curving upwards, slender, distinct on the lower surface; length 3 to 4 in., in breadth 1.25 to 2.5 in.; petiole .3 to .5 in. *Stipules* small, transversely oblong, very short (often only .05 in. long), pale; coriaceous, 2-lobed. *Panicles* about 1 in. long and twice as broad, ternately umbellate on the apex of naked compressed peduncles as long as or longer than the leaves: the umbels with 5 or 6 spreading flowers, minutely but deciduously bracteolate at the base. *Flowers* .4 in. long, on unequal pedicels shorter than themselves. *Calyx-tube* campanulate, the limb membranous, truncate or obscurely 5-toothed, deciduous, .1 in. long, *Corolla* .35 in. long, clavate in bud, the tube short, hairy within, the throat glabrous, the lobes 5, valvate in bud, their apices inflexed. *Stamens* 5, inserted in the throat of the corolla. *Anthers* linear, exserted. *Ovary* 2-celled with ovules 2 (or more?) in each cell. *Occluspermum scandens*, Hook. fil. Fl. Br. Ind. III. 159 *in part*. *Trisciadia truncata*, Hook. fil. in Gen. Plant. II. 69; Fl. Br. Ind. III. 94. *Webera truncata*, Roxb. Fl. Ind. ed. Carey and Wall. II. 538. *Stylocoryna truncata*, Wall. Cat. 8403. *Cupia truncata*, DC. Prod. IV. 394. *Pseudowora truncata*, Miq. Fl. Ind. Bat. II. 210.

PENANG: Wallich. SINGAPORE: Maingay (K.D.) 933.

2. COELOSPERMUM SCANDENS, Blume Bijl. 994. Scandent: the young branches cylindric, pale-brown, thinner than a goose-quill. *Leaves* broadly elliptic, or obovate-elliptic, much narrowed to the base; midrib and 4 or 5 pairs of spreading nerves faintly depressed on the upper surface, slightly prominent on the lower; length 2.5 to 5 in.; petioles .35 to .6 in. *Stipules* less than .1 in. long, narrow. *Peduncles* usually longer than the leaves, slender, compressed, bearing at the apex three pedunculate few-flowered umbels. *Flower-pedicels* unequal, shorter than the flowers. *Calyx* campanulate, less than .1 in. long, the mouth truncate, usually with 5 minute teeth. *Corolla* four times as long as the calyx, clavate in bud, salver-shaped, coriaceous; the tube slender, longer than the 5 reflexed linear-oblong valvate lobes. *Anthers* as long as the corolla-lobes, much exserted. *Ovary* 4-celled, each cell with a single ovule. *Fruit* depressed-globular, .4 in. across and .35 in. long, glabrous, shining, smooth but with 4 shallow ventral grooves and a minute apical areolus: pyrenes two, each 2-seeded. DC. Prod. IV. 468; Hook fil. Fl. Br. Ind. III. 159 (in part).

MALACCA: Griffith (K.D.) 3087. SINGAPORE: Ridley 109; Hullett 623. PERAK: King's Collector 3992, 7248.

The material is imperfect and we describe the characters of the ovary and ovules with some hesitation.

32. GUETTARDA, Linn.

Trees or shrubs. *Leaves* sometimes three in a whorl; stipules deciduous. *Flowers* secund on the branches of axillary forked pedunculate cymes. *Calyx-tube* short; the limb tubular, toothed, usually deciduous. *Corolla* with a long cylindric straight or curved tube, the limb with 4 to 9 lobes imbricate in bud. *Anthers* 4 to 9, linear, subsessile, included within the glabrous tube. *Ovary* with 4 to 9 elongate cells, with a solitary ovule in each cell; style filiform; stigma sub-capitate. *Drupe* more or less globular, crowned by the short calyx-limb; endocarp 4- to 9-celled, perforated near the apices of the cells. *Seeds* pendulous, oblong cylindrical or curved, testa membranous, albumen scanty or none. —DISTRIB. About 45 species; mostly American.

1. GUETTARDA SPECIOSA, Linn. Sp. Pl. 991. A small evergreen polygamous tree; young branches as thick as a goose-quill, deciduously puberulous. *Leaves* membranous, broadly obovate or ovate, cuspidate, narrowed to the rounded or sometimes minutely cordate, rarely acute base; upper surface pale-brown when dry, glabrous; the lower pale-greenish, puberulous, minutely reticulate; main-nerves 7 to 8 pairs, little curved, spreading, thin but rather prominent on the lower surface, faint on the upper; length 4 to 8 or 10 in.; breadth 3 to 7 in.; petioles .5 to 1.5 in.; stipules lanceolate or oblong, deciduous, .3 in. long. *Cymes* axillary or from the axils of fallen leaves; few-flowered, little-branched, on puberulous peduncles 1.5 to 2.5 in. long. *Flowers* 1.5 to 2 in. long, some sessile others on short pedicels. *Calyx* about .2 in. long, minutely velvety; tube short-grooved; limb widely cupular, truncate entire or faintly and irregularly toothed. *Corolla* salver-shaped, many times longer than the calyx, softly pubescent outside; the tube narrow; the limb 1 in. in diam. divided into 7 or 8 obtuse lobes. *Style* glabrous, stigma conical. *Drupe* depressed-ovoid or turbinate, woody, globose, obscurely lobed, 4- to 6-celled, about 1 in. in diam. Lam. III., t. 154 f. 2; Roxb. Fl. Ind. I. 686. Wall. Cat. 6219; W. & A. Prod. Fl. Pen. Ind. 422; Wight Ic. t. 40; Kurz For. Flor. Burm. II. 37; Hook. fl. Fl. Br. Ind. III. 126. *Cadamba jasmminiflora*, Sonner. Voy. Ind. II. t. 128. *Nictanthes hirsuta*, Linn. Sp. Pl. 8. *Jasminum hirsutum*, Willd. Sp. Pl. I. 36.—Rheede Hort. Mal. t. 47, 48.

In all the provinces—on the sea-coasts.—DISTRIB. Shores of the tropics of old and new worlds.

33. TIMONIUS, Rumph.

Shrubs or trees: stipules ovate-lanceolate, deciduous: leaves more

or less coriaceous. *Flowers* rather small, polygamo-dioecious, in axillary cymes. *Male* cymes with few or many secund flowers. *Female* 1- to 3-flowered, the pedicels bibracteolate. *Calyx-tube* short; the limb cupular, persistent. *Corolla* coriaceous, pubescent, funnel-shaped; the throat and the tube within glabrous; limb with 4 or 5 (rarely with 10) lobes, valvate in bud or nearly so. *Stamens* as many as the lobes of the corolla, inserted by short filaments in the tube; anthers linear, dorsifixed. *Disk* small, hispid. *Ovary* many-celled; style short, thick, hairy, with several more or less united linear (often unequal) branches; *ovules* solitary in each cell, pendulous. *Fruit* ovoid or globose, usually 4-grooved, composed of 12 to 24 or even 30 small elongated 1-celled 1-seeded pyrenes cohering by their sides and sunk in a 4-armed, placentiform mass, the whole being enclosed in an epicarp crowned by the remains of the calyx. *Seeds* cylindric, straight, rarely curved, with thick funicles and membranous testas; albumen scanty or absent: cotyledons small, radicle long.—DISTRIB. About 30 species, Tropical Asiatic and Polynesian.

Female flower solitary on a long peduncle :—

♂ peduncles long, slender, glabrous; leaves glabrous except the nerves beneath; fruit 4-grooved, glabrous ... 1. *T. Jambosella*.

♂ peduncles short, rusty-pubescent; leaves rusty-pubescent beneath; fruit not grooved, rusty-pubescent ... 2. *T. Wrayii*.

Female flowers in small pedunculate cymes ... 3. *T. Rumphii*.

Species of which ♂ flower and fruit are unknown :—

Stipules triangular, acuminate ... 4. *T. lasus*.

Stipules cupular, the mouth with several unequal linear points ... 5. *T. malaccensis*.

1. TIMONIUS JAMBOSELLA, Thwaites Enum. Pl. Ceyl. 153. A small ever-green tree or shrub; young branches thinner than a goose-quill, brown when dry, glabrous or sparingly silky. *Leaves* coriaceous, their margins sometimes recurved, lanceolate, elliptic-lanceolate, or elliptic, acuminate, the base narrowed, cuneate; both surfaces dull-brown when dry, glabrous; the lower paler, faintly reticulate; main-nerves 5 or 6 pairs, curving upwards, prominent and silky on the lower surface, less prominent and glabrous on the upper; length 2·5 to 4 in.; breadth 1 to 2·5; petioles 1 to 3 in.; stipules lanceolate, acuminate, silky, slightly exceeding the petioles. *Male* cymes 3- to 12-flowered, on peduncles 35 to 75 in. long. *Female* flowers solitary, on peduncles longer than those of the males: the calyx 4-gonous; suburceolate, the mouth with 4 shallow obscure teeth. *Corolla* hypocrateriform, 3 to 5 in. long, the throat valvate. *Anthers* slightly exserted. *Disk* large. *Stigmas* 4,

Fruit at first ellipsoid, but when ripe depressed-globose, 4-gonous, sub-truncate, about .35 in. across, crowned by the calyx-limb and large disk; crustaceous; covered by a smooth pericarp: the placentas 4, cruciate, each bearing about 6 ovules sunk in pits. Bedd. Ic. Pl. Ind. Or. t. 190; Hook. fil. Fl. Br. Ind. III, 127. *T. flavescens*, Baker Fl. Maurit. 144. *Nelitris Jambosella*, Gaertn. Fruct. I. 134, t. 90 (excl. syn.). *Helospora flavescens*, Jack in Trans. Linn. Soc. XIV. 127, t. 4, f. 3; DC. Prod. IV. 391; Miq. Fl. Ind. Bat. II. 234. *Euphyrena glabra*, W. & A. Prod. 423. *Bobea glabra*, Korth. in Ned. Kruidk. Arch. II. 211. *Polyphragmon flavescens*, Kurz For. Fl. Burm. II. 38. *Guetarda? peduncularis*, Wall, Cat. 6222; Don. Gen. Syst. III. 551. *G. Brunonis* and *G. missionis* Wall. Cat. 6220, 6221.

In all the provinces: common.—DISTRIB. Andaman Islands Ceylon, Malay Archipelago.

VAR. *Finlaysoniana*; leaves elliptic or elliptic-oblancolate, shortly acuminate or acute, 3 to 5.5 in. long, the petioles .3 to .6 in. long, fruit, nearly .5 in. in diam. *T. Finlaysoniana*, Hook. fil. Fl. Br. Ind. III. 127. *Guetarda Finlaysoniana*, Wall. Cat. 6223. *G. peduncularis*, Wall. Cat. 6222. *Timonius*, Wall. Cat. 8446.

SINGAPORE: Wallich, G. Thomson, Ridley 2762. PENANG: Curtis 3338. PERAK: King's Collector 1529, 6209. ANDAMAN ISLANDS: King's Collector.

2. *TIMONIUS WRAYI*, King & Gamble, n. sp. A tree 20 to 50 feet high; young branches as thick as a goose-quill, dark-brown when dry, the leaf-cicatrices large, distinct. Leaves coriaceous, elliptic or obovate-elliptic, sometimes rhomboidal, the apex acute, the base much narrowed into the long petiole; upper surface olivaceous-brown when dry, glabrous everywhere and shining; the lower paler, dull, the nerves and midrib adpressed rusty-sericeous, otherwise glabrous; main-nerves 6 or 7 pairs, only slightly curved, ascending, very bold on the lower surface like the midrib, somewhat depressed on the upper; length 5.5 to 8 in.; breadth 2.25 to 4.5 in.; petiole .6 to 1.5 in.; stipules lanceolate, acuminate, sparsely sericeous, about .5 in. long. Male cymes pedunculate, dichotomous, 6- to 8-flowered, the branches bracteate, short, spreading, everywhere densely rusty-pubescent: the peduncle about .5 in. long; flowers secund, sessile. Calyx .3 in. long, cylindric, campanulate with 4 broad blunt unequal lobes, densely rusty-pubescent outside. Corolla coriaceous with wide short tube and 4 blunt, concave, slightly imbricate lobes nearly as long as the tube, rusty-pubescent outside. Anthers 4, included, linear, sessile. Female flower not seen. Fruit solitary on a peduncle longer than that of the male cyme, ellipsoid or globose, crowned by the large calyx and with a single oblong bract at its base,

minutely rusty-pubescent, .6 in. in diam. when dry. *Seeds* about 12, in pits on the cruciform placentas.

PERAK: Wray 3200, King's Collector 5168.

This species is very distinct from the others described here. Its nearest ally is one from New Guinea, to which Dr. Scheffer gave the MS. name *Polyphragmon sessile*. But the latter has smaller leavemore hairy below and with rather more main-nerves; the petioles moreover are shorter, and the fruits have peduncles less than .1 in. long.

3. TIMONIUS RUMPHII, DC. Prod. IV. 461 A small tree. Young branches twice as thick as a crow-quill; striate, sparsely pubescent at first, finally glabrous. *Leaves* thinly coriaceous or membranous, narrowly elliptic, somewhat oblanceolate, shortly and bluntly acuminate, much narrowed at the base: upper surface dark-brown when dry, usually glabrous except for a few hairs on the midrib; the lower paler, minutely reticulate and with fine white adpressed-sericeous hairs; main-nerves 8 or 9 pairs, slightly curved, ascending, thin and faint on the lower surface, almost obsolete on the upper; length 3.5 to 5.5 in.; breadth, 1.5 to 2 in.; petiole .25 to .4 in.; pubescent; stipules lanceolate, caudate-acuminate, shorter than the petioles. *Male cymes* many-flowered pubescent, with many divergent trichotomous branches; the flowers .3 to .5 in. long, secund, sessile, pubescent; *calyx* campanulate .05 in. long. *Female cymes* trichotomous, on peduncles 1 to 1.25 in. long, and sometimes bearing small leaves. *Flowers* in threes, the middle one sessile, the two lateral pedicellate, .4 in. long. *Calyx* with a subulate bracteole at its base, about as long as the pedicel; the tube narrowly campanulate 4-grooved, densely tomentose, somewhat constricted at the base of the less hairy limb; lobes of limb 4, ovate, subacute, spreading. *Corolla* coriaceous, .3 in. long, twice as long as the calyx, outside adpressed-pubescent, inside glabrous; the tube cylindric; the mouth with 4 blunt lobes. *Anthers* 4, linear-oblong, sessile. *Style* stout, grooved by the pressure of the anthers, stigmatic lobes small. *Fruit* ellipsoid to subglobose, tetragonous, crowned by the erect calyx-lobes, densely covered with short white deciduous pubescence, .35 in. long: the placentas cruciate bearing many seeds, each enclosed in a woody pyrene. Hook. fil. Fl. Br. Ind. III. 127: Wall. Cat. 6217. *Bobea Wallichiana*, Korth in Ned. Kruidk. Arch. II. 211.—Rumph. Herb. Amb. III. 216 t. 140.

In all the provinces: common;—DISTRIB. Malay Archipelago.

Near *T. Jamboella*, but with more hairy leaves, more numerous main-nerves and hairier inflorescence. The female flowers are in small cymes instead of being solitary as in that species.

4. TIMONIUS LAXUS, King & Gamble, n. sp. A tree 20 to 30 feet high; young branches thicker than a crow-quill, covered with coarse

short rusty-deciduous hairs, the leaf-cicatrices bold. *Leaves* thickly membranous, narrowly elliptic-obovate, shortly acuminate, the base cuneate: upper surface dark-brown when dry, glabrous; the lower paler, minutely rusty-pubescent especially on the nerves and stont midrib; main-nerves 5 or 6 pairs, curved upwards, bold on the lower surface, slightly depressed on the upper; length 3·5 to 5 in.; breadth 1·5 to 2·25 in.: petioles ·1 to ·15 in.; stipules about ·35 in. long, triangular with long apices, the midrib rusty-pubescent. *Male cymes* on slender pubescent peduncles 1 to 2 in. long, with 2 diverging 1- to 2-flowered branches and a sessile flower at the fork. *Flowers* 3·5 in. long, those on the branches on pedicels ·3 in. long. *Calyx* cupular, subentire, less than ·1 in. long. *Corolla* thickly coriaceous, outside with dense yellowish-brown silky tomentum, inside nearly glabrous, the tube cylindric, the mouth with 4 broad blunt lobes one-third of the length of the tube. *Female flowers* and *fruit* unknown.

PERAK: *King's Collector* 10609.

This has been collected only once and its female flowers and fruit are unknown. It appears to be near *T. Jambosella* but differs in its hairy leaves and lax, long-peduncled male cymes.

5. *TIMONIUS MALACCENSIS*, King & Gamble, n. sp. A small tree? Young branches slender, obtusely 4-angled, clothed in dense pale minute tomentum. *Leaves* membranous, broadly oblanceolate or elliptic, bluntly and shortly acuminate, narrowed to the base; upper surface glabrous, the midrib alone minutely rufous, puberulous when young, pale-brown when dry; the lower paler, reticulate, with sparse slender pale hairs, the midrib and main-nerves cinereous-tomentose; main-nerves 5 or 6 pairs, little curved, ascending; length 3·5 to 4·5 in., breadth 1·5 to 1·75 in.; petioles ·15 to ·2 in.; stipules shortly cupular the mouth with several unequal filiform processes, two being very long. *Cymes* 2 or 3 in the uppermost leaf-axils, about 6-flowered, one quarter of the length of the leaves, tomentose; their peduncles ·35 to ·6 in. long. *Flowers* densely pubescent outside, their pedicels ·05 in. long. *Calyx* tomentose, slightly more than ·1 in. long, campanulate: the mouth with 4 broad, triangular, spreading lobes. *Corolla* nearly twice as long as the calyx, salver-shaped, pubescent outside, glabrous inside except the villous throat; limb with 4 ovate-lanceolate sub-acute lobes. *Anthers* 4, subsessile in the throat, short, elliptic. *Style* stout, elongate, sparsely hairy below, divided into several broad flat truncate stigmatic lobes. *Fruit* unknown.

MALACCA: (on Mount Ophir) *Ridley* 3217.

This differs notably from *T. Rumphii* in its shorter flowers and its stipules. The leaves also differ. It has been only once collected.

Erect herbs or under-shrubs; stems terete or obtusely angled with linear lines of hairs or glabrous. *Leaves* equal, usually narrow, stipules connate with the petiole to form a truncate cup often with bristles on its mouth. *Flowers* white, pink or lilac, small, dimorphous, in corymbose cymes. *Calyx-tube* ovoid or didymous; teeth 4 minute, subequal or 1 or 2 elongate, persistent. *Corolla-tube* long, its throat villous; lobes 4, valvate in bud, with the tips inflexed. *Stamens* 4, inserted on the throat; anthers linear, included or exserted. *Ovary* 2-celled: style filiform: stigma included or exserted, 2-lobed: ovules solitary in each cell, pendulous. *Fruit* globose or oblong, small, of two semi-terete or dorsally compressed indehiscent cocci. *Seeds* with membranous testa and thick funiculus; albumen fleshy; embryo axile, the cotyledons thin and the radicle superior.—DISTRIB. Species about 10: Indian, Malayan and Australian.

KNOXIA CORYMBOSA, Willd. Sp. Plant I. 582. Herbaceous, 1 to 4 feet high. *Stem* terete or obscurely 4-angled, little-branched, pubescent, tomentose or villous, never glabrous. *Leaves* membranous, pale-brown and somewhat olivaceous when dry, petiolate or sessile, narrowly elliptic, linear or ovate-lanceolate, tapered to each end, the apex acuminate; both surfaces hairy like the stems: main-nerves 5 to 9 pairs, rather straight, ascending, most prominent on the lower surface; length 1·5 to 5 in.; breadth ¼ to 1 in.; petiole ½ to ¼ in. or more. *Stipules* narrowly cupular, their edges with bristles 1 to 2 in. long. *Corymbs* on the end of the branches, shorter than the leaves, minutely bracteolate, trichotomous; the ultimate branches spicate when in fruit. *Flowers* ½ in. long, on peduncles shorter than themselves, white or purplish. *Calyx* ovoid, with 4 broad blunt triangular sub-equal teeth. *Corolla-tube* hairy within. *Fruit* less than ½ in. long, puberulous. W. & A. Prod. 439; Wight Ill. t. 123: Dalz & Gibs. Fl. Bomb. 111. Hook fil. Fl. Br. Ind. III. 128. *K. teres*, DC. Prod. IV. 569; Wall. Cat. 819 *in part*. *K. exserta*, DC. l.c. *K. umbellata*, Banks; Spreng. Syst. I. 406. *K. sumatrensis*, Wall. Cat. 6183. *K. mollis*, Br. in Wall. Cat. 820, *not of* W. & A. *K. stricta*, Thw. Enum. 152. *Spermacoce?* *teres* and *S. exserta*, Roxb. Hort Beng. 10; Fl. Ind. I. 367, 368: Ed. Carey & Wall. I. 373, 374. *S. sumatrensis*, Retz Obs. IV. 23, ex Cham. & Schl. in Linnæa, III. 316 (*not of* Roxb. Fl. Ind. I. 336?) *Cuncea trifida*, Ham. in Don Prodr. 135.

In all the provinces.—DISTRIB. Malayan Archipelago, British India, tropical Australia.

35. CANTHIUM, Lam.

Shrubs (sometimes climbing), unarmed or spinous, their stipules often connate. *Flowers* small, axillary, fascicled, or in corymbose, often

pedunculate, cymes; sometimes polygamous. *Calyx* with short tube and short persistent or deciduous cupular 4- or 5-toothed limb. *Corolla-tube* funnel-shaped, campanulate or urceolate, usually with a ring of deflexed hairs in the throat; limb 4-5-lobed, valvate in bud, finally reflexed. *Anthers* equal in number to the lobes of the limb, inserted in the mouth or throat of the corolla, sessile or on short filaments. *Disk* annular, tumid or depressed. *Ovary* 2-celled; style stout; stigma large, entire or bifid; ovules solitary in the loculi and pendulous. *Drupe* didymous or sub-globose or (when one of the carpels is suppressed) reniform, with 1-2 pyrenes, or a 2-celled putamen. *Seeds* pendulous, oblong, with membranous testa and fleshy albumen; embryo elongate, sub-terete; the cotyledons short and the radicle superior.—**DISTRIB.** About 80 species; in Asia, Africa, tropical Australia and Polynesia.

Flowers 1 in. long, solitary or in pairs, axillary ... 1. *C. pauciflorum*.

Flowers less than 5 in. long, in axillary cymes:—

Spiny straggling or scandent shrubs with more or less hairy leaves:—

Leaves rarely so much as 1.5 in. long, with 3 pairs of main-nerves, the remains of the calyx on the top of the fruit inconspicuous ...

... 2. *C. parvifolium*.

Leaves 2 to 3 in. long with 5 pairs of main-nerves: fruit crowned by the large calyx-tube ...

... 3. *C. molle*.

Unarmed trees or shrubs, glabrous or nearly so:—

Corolla-tube wide, short:—

Fruit much compressed, obovate, about .15 in. long; pyrenes not keeled: whole plant quite glabrous ...

... 4. *C. confertum*.

Fruit ellipsoid, smooth, obscurely 4-angled, somewhat compressed, 1 in. or more in length: pyrenes prominently keeled on the back, not warted; leaves with a few adpressed hairs on their lower surface ...

... 5. *C. glabrum*.

Corolla salver-shaped, the tube very narrow. Fruit much compressed, didymous, minutely velvety, .25

to 6 in. long: pyrenes warted, not keeled: leaves quite glabrous ...

... 6. *C. didymum*.

1. *CANTHIUM PAUCIFLORUM*, King & Gamble, n. sp. A spiny glabrous shrub 15 to 20 feet high: young branches thicker than a crow-quill, pale, terete; spines few, slender, curved, shorter than the petioles, supra-axillary. *Leaves* membranous, elliptic-ovate, shortly and somewhat obtusely acuminate, the base cuneate; both surfaces pale olivaceous-brown when dry, dull; main-nerves 4 to 5 pairs, spreading, somewhat prominent on the lower surface but evanescent at the tips, almost obsolete on the upper; length 4 or 5 in.; breadth 1.5 to 2.25 in.;

petioles .15 to .25 in.; stipules small, broadly triangular. *Flowers* about 1 in. long, solitary or in pairs on a short minutely bracteolate axillary branch. *Calyx* .2 in. long, cupular-campanulate, the mouth with 5 short broad acute teeth. *Corolla* with a wide cylindric tube .5 in. long, having a ring of hairs inside near the base, otherwise glabrous; the limb with 5 lanceolate erect or spreading lobes half as long as the tube. *Anthers* exserted, narrowly oblong, inserted by short filaments in the glabrous throat. *Ovary* 2-celled; style exserted; stigma mitriform, oblong, 2-partite. *Fruit* nearly 1 in. long, pulpy, smooth, crowned by the large wide calyx-tube. *Plectronia pauciflora*, K. & G. MS.

PERAK: *Scortechini*, 62.

At once distinguishable by its large flowers, solitary or in pairs.

2. *CANTHIUM PARVIFOLIUM*, Roxb. Hort. Beng. 15: Fl. Br. Ind. I. 534. A rambling spiny shrub often subscandent or scandent; young branches thicker than a crow-quill, angled, at first densely rusty addressed-pilose, ultimately often sub-glabrous; spines supra-axillary, .05 to .2 in. in length, straight or curved, pubescent at the base, the tips glabrous and shining. *Leaves* small, subcoriaceous, greenish when dry, ovate or elliptic, acute, the base cuneate; upper surface glabrous; the lower often sparsely hairy; the three pairs of slightly curved ascending main-nerves and the midrib pubescent usually on both surfaces; length .75 to 1.5 in.; breadth .5 to .75 in.: petioles .05 to .15 in.; stipules broad and short with an acute abrupt point. *Flowers*. .2 in. long, in small axillary clusters, on short pedicels. *Calyx* cupular-truncate, entire, or minutely 4- to 5-toothed. *Corolla* several times longer than the calyx: the tube widely tubular in bud and constricted below the limb, when expanded the tube globular, glabrous outside, but with a ring of dense deflexed white hairs inside; the limb with 4 or 5 lanceolate deflexed lobes. *Anthers* partly exserted, ovate, on short filaments. *Stigma* mitriform, sulcate. *Fruit* when ripe the size of a small cherry or black currant, glabrous. DC. Prod. IV, 474. Hook. fil. Fl. Br. Ind. III, 135. *C. scandens*, Blume Bijdr. 966; DC. Prod. IV, 475. *C. horridum*, Blume Bijdr. 966; DC. Prod. IV, 474; Miq. Fl. Ind. Bat. II, 255; Hook. fil. Fl. Br. Ind. III, 135. *Plectronia parvifolia* and *P. horrida*, Kurz. For. Fl. Burm. II, 36. *Gardenia rigida*, Wall. Cat. 8257 in part. *C. zizyphinum*, Wall. Cat. 8288 A. *C. Rubiacea*, Wall. Cat. 8288 B. *Hyptianthera rhamnoides*, Zoll. et Mor. in Zoll. Syst. Verzeichn. 60. *Dondisia horrida*, Korth. in Ned. Kruidk. Arch. II, 236.

In all the provinces: not uncommon.

We have here reduced Blume's species *C. horridum* to the older one of

Roxburgh; for we can find no character to separate the two, the form of the spines, the size of the fruit, and the amount of pubescence hitherto relied upon being as a matter of fact inconstant.

3. *CANTHIUM MOLLE*, King & Gamble, n. sp. A straggling spiny shrub (? scandent); all parts more or less densely pale rusty-pubescent; the young branches thinner than a goose-quill, dark-brown, more or less 4-angled; spines stout, supra-axillary, much curved downwards, .2 to .6 in. long. *Leaves* thickly membranous, ovate to ovate-lanceolate, shortly acuminate, the base cuneate or rounded; main-nerves about 5 pairs, spreading, slightly prominent on the lower surface when dry, obsolete on the upper; length 2 to 3 in.; breadth .75 to 1.5 in.; petioles .15 to .2 in.; stipules broadly triangular, apiculate, very short. *Flowers* .2 in. long, on pedicels nearly as long, in small axillary cymes or on short, minutely bracteolate, sometimes leaf-bearing, axillary branches. *Calyx* small, cupular, with 5 small acute teeth. *Corolla* with a wide tube glabrous outside, but inside with a ring from the throat of long deflexed white stout hairs: the lobes of the limb about as long as the tube, narrowly oblong, glabrous, deflexed. *Anthers* sessile, shortly oblong, exserted. *Style* exserted; stigma large, ovoid-globose, ridged. *Fruit* unknown.

SINGAPORE: in the Bot. Garden Jungle; Ridley 2859.

4. *CANTHIUM CONFERTUM*, Korth. in Ned. Kruidk. Arch. II, 235. A shrub? everywhere glabrous; young branches rather thicker than a crow-quill, pale brown and striate when dry. *Leaves* coriaceous, ovate when dry, elliptic or elliptic-lanceolate, shortly and bluntly acuminate, the base narrowing into the petiole; both surfaces dull, the reticulations obsolete; main-nerves 3 (rarely 4) pairs, oblique, ascending, scrobiculate at the axils, rather faint on both surfaces; length 2.5 to 4 in.; breadth 1.25 to 1.75 in.; petioles about 3 in., winged in the upper half; stipules triangular, acuminate, much shorter than the petioles. *Cymes* sessile, shorter than the petioles, the very short axis bearing a few minute bracts and 6 or 8 flowers on pedicels .1 in. long. *Flowers* .25 in. long. *Calyx* very short and cupular, with 5 often minute teeth. *Corolla* coriaceous, rotate, the tube very short: the 5 lobes broadly triangular with thickened edges, reflexed, villous inside and bearing between the lobes 5 ovate exserted anthers on short filaments. *Style* .1 in. long, bearing a large capitate-peltate corrugated stigma. *Disk* large, thick, cushion-like. *Fruit* solitary, on a thin peduncle .15 in. long, compressed, obovate, smooth, cushion-like, glabrous. Hook. fil. Fl. Br. Ind. III, 133. *C. glomerulatum*, Miq. Fl. Ind. Bat. Suppl. 585. *Memo-cylon pauciflorum*, Wall. Cat. 4114.

MALACCA: Griffith (K.D.) 2973; Muirguy (K.D.) 862, 942. PENANG:

Wallich, Curtis 1119, 694. SINGAPORE: Ridley 302, 358, 1895, 4124, 4893, 9421, 9518, 9857. JOHORE: King and Hullett. PAHANG: Ridley 2245. PERAK: *Scortechini*.

5. *CANTHIUM GLABRUM*, Blume Bijdr. 967. A small unarmed tree: young branches thinner than a goose-quill, 4-angled, pale-brown when dry, glabrous. *Leaves* thickly membranous or sub-coriaceous, elliptic or ovate-elliptic, olivaceous and dull when dry, shortly and rather abruptly acuminate, the base slightly and abruptly narrowed, or broad and rounded; upper surface glabrous, the lower with some white sub-adpressed hairs, especially by the sides of the stout midrib and larger nerves; main-nerves 6 to 8 pairs, spreading, slightly curved, inconspicuous on the upper and only slightly conspicuous on the lower surface; length 5 to 7 in.; breadth 2 to 3 in.; petiole .4 to .6 in. *Stipules* broadly triangular at the base, much acuminate, shorter than the petioles. *Cymes* many-flowered, about 1 in. in diam., on short peduncles, dichotomously branched. *Flowers* pentamerous, .15 in. long, their pedicels slightly shorter. *Calyx* shortly campanulate or cupular, the mouth undulate and with 5 small triangular teeth. *Corolla* widely tubular, constricted at the throat, the limb with 5 deep valvate broadly lanceolate acute spreading or reflexed lobes. *Anthers* ovate, on short filaments in the throat, with a line of vertically deflexed stout white hairs just below them. *Stigma* large, sub-globular, rather turbinate, corrugated. *Ovary* 5-celled. *Fruit* ellipsoid, pulpy, 4-angled (when dry) often compressed, smooth outside, the two enclosed pyrenes triangular, the inner face of each being flat, the outer faces deeply grooved so as to leave a bold central keel. DC. Prod. IV, 478: Hook. fil. Fl. Br. Ind. III, 133. *Plectronia glabra*, Kurz For. Fl. II, 35. *Vangueria? atroviridis*, Wall. Cat. 8412. *Rubiacea*, Wall. Cat. 8303.

In all the provinces: common.

This species is easily distinguished from *C. didymum* by its short widely tubular corolla slightly constricted just below the limb, that of *C. didymum* being hypocrateriform with a narrow tube. The fruit of this is also large and quite glabrous.

6. *CANTHIUM DIDYMU*M, Gaertn. fil. Fruct. III, 94. A tree: young branches without spines, nearly as thick as a goose-quill, 4-angled, at first brown, but afterwards pale, smooth, the nodes thickened. *Leaves* thinly coriaceous, glabrous, narrowly elliptic or ovate-lanceolate, occasionally sub-orbicular, the apices sub-acute, acute or shortly and bluntly acuminate, usually much narrowed at the base, but sometimes rounded; upper surface dark-brown when dry, shining, the lower paler: main-nerves 3 to 5 pairs, slightly curved, ascending, thin but prominent on the lower surface as is the midrib, faint on the upper; length 2.5 to 6 in.; breadth 1.5 to 3.5 in.; petioles .25 to .3 in.; stipules .25 in. long,

triangular, with broad base and narrowly acuminate apex. *Cymes* subsessile or on short peduncles (.25 to 1 in. long) sometimes puberulous; branches longer than the peduncles, spreading, corymbose, crowded, many-flowered. *Flowers* about .25 in. long, on unequal slender pedicels. *Ovary* less than .1 in. long, narrowly campanulate; mouth with short acute teeth or truncate. *Corolla* salver-shaped, the throat villous: the mouth with 5 blunt oblong deflexed lobes as long as or longer than the tube. *Anthers* narrowly oblong, on filaments half their length, inserted on the throat, exserted and deflexed. *Style* glabrous; stigma subquadrate, notched or bifid. *Fruit* variable, always compressed and more or less didymous, usually somewhat obovoid or obovoid-ellipsoid, .25 to .6 in. long, minutely velvety: pyrenes with hard dark warted putamen. Roxb. Fl. Ind. I, 535; W. & A. Prodr. 425; DC. Prod. IV, 473; Wall. Cat. 8413; Hook fil. Fl. Br. Ind. III, 132; Trimen Fl. Ceyl. II, 343. *Plectronia didyma*, Kurz For. Flor. Burma. II, 35. *Psydrax dicoccos*, Gaertn. Fruct. p. 125, t. 26; DC. Prod. IV, 476. *Vangueria dicocca* Miq. Fl. Ind. Bat., II 250. *Webera cymosa*, Willd. Sp. p. 1224. *Indeterm.* Wall. Cat. 9069.

In all the provinces, very common.

The South Indian species *C. umbellatum*, Wight, Ic. 1034 is, in my opinion, only a form of this species.

Doubtful Species.

7. *CANTHIUM GRiseum*, King & Gamble. A shrub? Young branches nearly as thick as a goose-quill, striate and purplish-brown when dry. *Leaves* membranous, narrowly elliptic, tapering to each end; upper surface dark, sparsely strigose when young, afterwards glabrous; lower surface cinereous with pale curved hairs, especially on the midrib and 4 or 5 pairs of rather prominent little-curved ascending main-nerves; length (when young) 2 to 2.5 in.; breadth .75 to 1.25 in.; petioles .2 to .25 in.; stipules broadly triangular, acute, much shorter than the petioles. *Flowers* .2 in. long, pedicellate, crowded on short multi-bracteolate axillary branches longer than the petioles, the pedicels .15 to .2 in. long, pubescent. *Ovary* one-third the length of the corolla, rotate, with 5 long narrow spreading lobes. *Corolla* much pointed in bud, with a short wide tube puberulous outside but densely hairy inside; the 5 lobes about as long as the tube, triangular, acuminate, sub-erect. *Anthers* sub-sessile in the tube, included, elliptic. *Stigma* large, globose, ribbed. *Fruit* unknown.

LANKAWI; Curtis 2804.

Only once collected. Has a strong superficial resemblance to *Vangueria spinosa* Roxb.

36. MESOPTERA, Hook fil.

A tree with stout terete branches and large, very coriaceous leaves: stipules large, coriaceous, unequal. *Flowers* minute, in dense ebracteolate axillary cymes shorter than the petioles. *Calyx-tube* short, hemispheric, 5-toothed. *Corolla-tube* short; throat hairy; lobes of the limb short, acute, valvate in bud. *Stamens* 5, inserted on the throat; filaments short, subulate; anthers oblong, apiculate. *Ovary* 2-celled: style short, stout; stigma capitate, 10-lobed: ovules 1 in each cell, attached to the septum. *Fruit* small, 2-celled and didymous, or 1-celled and globose, smooth: pericarp coriaceous, with a thin fleshy covering. *Seeds* cup-shaped, embracing a thick horny projection from the inner angle of the cell; testa adnate to the fleshy albumen: embryo slender, cylindric, coiled in the middle of the albumen; cotyledons short, obtuse; radicle long, superior.—A single Malayan species.

MESOPTERA MAINGAYI, Hook fil. in Benth. & Hook. fil. Gen. Plantar. II. 131; Fl. Brit. Ind. III, 137. Young branches as thick as a goose-quill, deciduously rusty-tomentose. *Leaves* elliptic or broadly ovate; shortly acuminate, smooth and shining on the upper surface, rusty-tomentose on the lower; main-nerves 5 to 7 pairs, curved, ascending, depressed on the upper, bold and prominent on the lower surface; length 7 to 9 in.; breadth 4·5 to 5·5 in. *Stipules* very unequal and obtuse, with strong parallel nerves, one obliquely oblong, 1 in. in length, the other shorter and rounded; petiole ·5 in. long, very stout. *Cymes* less than ·5 in. in diam. in flower, but in fruit 2·25 in. in diam. and much branched, pubescent. *Fruit* when didymous ·2 to ·25 in. across; when single-seeded and globular about half as much.

MALACCA: Maingay (K.D.) 939.

Known only from Maingay's two specimens in Herb. Kew. The above description is mainly copied from Sir Joseph Hooker's.

37. GARDENIOPSIS, Miq.

Shrubby or sub-arboreous, glabrous, with stout branches. *Leaves* very coriaceous, oblanceolate, many-nerved; stipules lanceolate, caducous. *Flowers* in small somewhat supra-axillary clusters without bracts or bracteoles. *Calyx* small, its tube cylindric; the limb with 5 spreading lobes. *Corolla* much larger than the calyx (1 in. or more in length); its tube widely cylindric, less than half as long as the limb; lobes of limb large, ovate, imbricate. *Stamens* 5, inserted near the base of the corolla-tube; the anthers linear, acuminate, included. *Style* short, stigma fusiform acute; ovary 2-celled with 1 ovule in each cell. *Fruit* broadly ovoid, rugulose, with 10 broad bold ridges, its sub-truncate apex

surrounded by the enlarged thickened incurved calyx-lobes, 2-celled, 2-seeded. **DISTRIB.**—One or perhaps two species, both Malayan.

GARDENIOPSIS LONGIFOLIA, Miq. in *Ann. Mus. Lugd. Bat.* IV. 250 and 262. A small tree 10 or 12 feet high: young branches as thick as a goose-quill, pale-brown. *Leaves* coriaceous, oblanceolate, gradually narrowed, in their lower three-fourths, to the stout petiole; main-nerves 15 to 20 pairs, slightly curved upwards and interarching $\cdot 1$ in. from the slightly recurved edges, the intermediate nerves are numerous but fainter, all prominent on the lower surface and depressed on the upper; both surfaces yellowish-brown, the lower paler and reticulate, length 6 to 16 in.; breadth $1\frac{1}{2}$ to $3\frac{1}{2}$ in.; petioles $\cdot 3$ to $\cdot 5$ in. long; stipules narrowly lanceolate, acuminate, $\cdot 4$ to $\cdot 5$ in. long. *Flowers* sessile in clusters of 5 or 6; the calyx-tube about $\cdot 1$ in. long: the limb about $\cdot 15$ in. across, its lobes ovate. *Fruit* $\cdot 4$ to $\cdot 6$ in. long.

MALACCA: Derry 960. **PERAK:** *Scortechini* 1234; *Wray* 2832, 3693; *King's Collector* 2361, 2850, 6934; *Ridley* 9722. **PAHANG:** *Ridley* 2661. **NEGRI SEMBILAN:** *Ridley* 10081. **DISTRIB.**—Sumatra.

There is what appears to be a distinct species of this in Borneo (*Haviland* 3011) with longer narrower calyx-lobes and fruit $1\frac{1}{2}$ in. long.

38. WEBERA, Schreber.

Trees or shrubs with thinly coriaceous or membranous leaves drying black. *Flowers* in terminal panicle cymes, usually on bi-bracteolate pedicels. *Calyx-tube* campanulate or urceolate, the limb 5-toothed or 5-partite. *Corolla* cylindric or narrowly funnel-shaped; its tube shorter, equal to or longer than the lobes of the limb; throat glabrous or with a line of hairs; limb 5-lobed, narrowly oblong, spreading or reflexed, twisted in bud. *Stamens* 5, linear, inserted by short filaments on the throat. *Style* short, usually pubescent; *stigma* long, spindle-shaped or ligulate, grooved, exserted. *Ovary* 2-celled, each cell with a single or at most with 2 ovules. *Fruit* baccate, with little pulp, 2-celled; each cell with a single plano-convex seed often cupped on the plane surface: testa various, albumen fleshy or horny; embryo small, cotyledons leafy. **DISTRIB.**—About 20 species, all tropical.

The genus *Webera*, as understood in Hooker's *Flora of British India*, is composed of two sets of plants, one with 2 or more ovules in each cell of the ovary, the other with only a single ovule in each. The former are, in that work, formed into the section *Euwebera*. In these *Materials* the same plants are described under the genus *Stylocoryna* of Cavanilles. By other authors they have been treated as a genus either under the name of *Tarenna*, Gaertner or of *Chomelia*, Linn. (not of Jacquin and Velloso). The species with single ovules in each cell are, in the *Flora of British India*, grouped in a section named *Pseudizora*. Here they are treated under the generic name *Webera*. The two sections, *Euwebera* and *Pseudizora*, are

thus, on account of their ovulation, removed to distant positions in the family of *Rubiaceæ*.

Lobes of the corolla longer than its tube :—

Apices of the corolla-lobes acuminate, reflexed in bud and forming a stem at the apex of the flower-bud : fruit ovoid

1. *W. stellulata*.

Apices of the corolla-lobes not linear or reflexed in bud ; fruit globular :—

Lobes of corolla with ciliate margins ; calyx .25 in. long, its lobes large, oblong-lanceolate, acuminate

2. *W. Ridleyi*.

Lobes of corolla glabrous ; calyx .15 in. long, its lobes broadly triangular, acute :—

Leaves 5 to 8 in. long, with 8 to 10 pairs of nerves

3. *W. Wallichii*.

Leaves 2.5 to 3.5 in. long, with 5 or 6 pairs of nerves

4. *W. Curtisi*.

Lobes of the corolla and its tube of equal length ...

5. *W. odorata*.

Lobes of the corolla shorter than its tube :—

Cymes trichotomously paniced, on peduncles several inches in length :—

Calyx a little over .1 in. long, the limb with 5 short blunt teeth ; leaves glabrous with 8 to 10 pairs of nerves

6. *W. grandifolia*.

Calyx .15 in. long, the limb with 5 deeply linear lobes as long as its tube ; leaves puberulous beneath, with 8 to 16 pairs of nerves

7. *W. longifolia*.

Cymes condensed, with very short peduncles :—

Leaves glabrous and with 16 to 18 pairs of sub-horizontal nerves ; lobes of calyx linear-lanceolate, longer than the tube

8. *W. Wrayi*.

Leaves with scattered adpressed hairs on the under surface, especially on the midrib and 8 to 10 pairs of nerves ; lobes of calyx less than half as long as its tube, triangular, sub-acute ...

9. *W. Yappii*.

1. *WEBERA STELLULATA*, Hook. fil. Fl. Br. Ind. III. 104. A shrub : young branches much thinner than a goose-quill, dark-coloured, subterete, glabrous. *Leaves* thinly coriaceous, oblong-elliptic to elliptic, shortly acuminate at the apex, cuneate at the base, upper surface glabrous, shining, very dark when dry, the midrib and nerves depressed ; the lower paler and dull, sometimes puberulous when young, but usually glabrous ; main-nerves 7 to 10 pairs, rather faint, curved, ascending : length 4.5 to 9 in. ; breadth 1.5 to 2.5 in. ; petiole .25 to .4 in. ; stipules ovate, acuminate, .15 in. long. *Cymes* (including the short peduncle) 1 to 1.5 in. long, terminal, solitary, at first puberulous, afterwards glabrous, trichotomous, rather few-flowered ; the bracteoles

linear-lanceolate, persistent. *Flower-pedicels* shorter than the calyx, bracteolate. *Calyx* about .15 in. long, narrowly campanulate, cut about half-way down into 5 acute triangular lobes. *Corolla* .4 in. long; the tube cylindric, only .1 in. long; the limb .3 in. long, its lobes imbricate, oblong, acuminate with free reflexed linear points; throat slightly hairy. *Anthers* linear, acuminate, on short filaments, included. *Ovary* with two 1-ovuled cells; *style* much shorter than the fusiform hairy included stigma. *Fruit* broadly ovoid or sub-globular, crowned by the calyx-lobes, glabrous, .4 in. long. *Seeds* 2. *Styllocoryne* Webera, Wall. Cat. 810 I (in part). *Pavetta aristata*, Wall. Cat. 6169.

PENANG: Wallich. MALACCA: Griffith (K.D.) 3086; Maingay (K.D.) 850. SELANGOR: Ridley, 10220. PERAK: King's Collector, 973, 4309, 5951, 6169, 10228; Wray, 458, 1094, 3745.

Some of the specimens of this have the leaves of a pale olivaceous-brown colour (when dry), contrasting in this respect strongly in colour with the majority which are very dark. The species is well-marked by its corolla, the tube of which is only one-quarter as long as the oblong lobes of the limb, while the five linear points of the latter are reflexed and form a kind of star at the apex of the flower-buds. The lobes do not appear to expand, for in all the specimens I have seen they remain convolute.

2. WEBERA RIDLEYI H.H.W. Pearson MSS. in Herb. Kew. A low glabrous shrub; young branches pale-brown, obtusely 4-angled. *Leaves* thinly coriaceous, narrowly elliptic, acute or shortly acuminate, the base cuneate; both surfaces olivaceous-brown, shining (especially the upper) when dry, main-nerves 10 to 14 pairs, curved, spreading, faint but distinct on both surfaces; length 5.5 to 7 in.; breadth 2 to 3 in.; petioles .4 to .7 in.; stipules broadly triangular, acute, about .2 in. long. *Cymes* several together, terminal, in short pedicels, trichotomous, few-flowered; the branchlets angled and with a few permanent boat-shaped acute bracteoles. *Flower* pedicels about as long as the calyx, bracteolate near the apex. *Calyx* .25 to .3 in. long, campanulate, the limb as long as the tube, deeply divided into 5 oblong-lanceolate acuminate lobes. *Corolla* not much longer than the calyx; the tube short; the limb three times longer and deeply divided into 5 oblong, acute, contorted lobes with ciliate margins. *Anthers* 5, inserted on the throat in a band of hair. *Ovary* with two uni-ovulate cells; *style* very short; stigma fusiform, sulcate, glabrous. *Fruit* fusiform, glabrous, the calyx-scar apiculate.

SINGAPORE: at Chan Chu Kang, Ridley, 6147. JOHORE: King, 602, PERAK: King's Collector, 4585, 4615.

Only once collected and not in fruit; flowers white. A species near *W. Wallichii* but with longer corolla lobes ciliate at the margin.

3. *WEBERA WALLICHII*, Hook fil. Fl. Br. Ind. III. 105. A shrub 4 to 8 feet high, glabrous except the branches of the inflorescence and the calyx: young branches thinner than a goose-quill, usually dark-coloured, obscurely 4-angled. *Leaves* membranous, oblong-elliptic, oblong, or elliptic, rarely oblanceolate, the apex shortly acuminate, the base cuneate; both surfaces more or less darkly olivaceous when dry, the midrib rather bold; main-nerves 8 to 10 pairs, slightly curved, ascending, thin and only slightly prominent; length 5 to 8 in.; breadth 2 to 2.75 in., petiole .4 to .6 in. *Stipules* broadly triangular, acuminate, .25 in. long. *Panicles* terminal, much branched, shortly pedunculate, about 1.25 to 2.5 in. long including the peduncle, and equally broad branches and their divisions puberulous, cymose; bracteoles triangular acute, about 1 in. long. *Flowers* .4 to .6 in. long, on compressed pedicels longer than the calyx. *Calyx* .15 in. long, bracteolate (often bibracteolate) at the base, shortly campanulate, with 5 broadly triangular acute teeth, puberulous externally. *Corolla* .45 in. long, glabrous, salver-shaped, the short tube with a belt of hair inside: the lobes linear-lanceolate, longer than the tube, reflexed. *Anthers* 5, exserted, linear-oblong, the apex sub-acute, the base blunt and prolonged beyond the attachment to the short filament. *Style* cylindric, hairy in the middle: stigma as long as the style, compressed, exserted. *Fruit* fusiform, glabrous, reticulate when dry, shining, not ridged, crowned by the small calyx, .4 in. long and .3 in. in diam. *Seeds* 2. *Stylocoryne Webera*, Wall. Cat. 840, I (for the most part). *Pavetta weberæfolia*, Wall. Cat. 6182 A, in part B.

MALACCA: Griffith (K.D.) 3084, 3004; Maingay (K.D.) 851.
PERAK: Wray, 3745; King's Collector, 1932, 2516, 2921, 2794, 5032, 5957, 10228; Scortechini, 429.

4. *WEBERA CURTISII*, King, n. sp. A small shrub; all parts glabrous except the cinereous-puberulous inflorescence. *Leaves* coriaceous, narrowly elliptic, shortly acuminate, the base cuneate; both surfaces drying dark olivaceous-brown, the lower paler; main-nerves 5 or 6 pairs, rather straight, ascending: length 2.5 to 3.5 in.; breadth .9 to 1.35 in. petiole .15 to .3 in.; stipules ovate or ovate-lanceolate, much acuminate. *Cymes* terminal, sub-sessile, only about 1 in. in diam. each way, trichotomous, few-flowered, the short branches and the flower-pedicels cinereous-puberulous, angled; pedicels slightly longer than the calyx; *Calyx* .1 in. long, campanulate; the limb with 5 acute triangular erect lobes. *Corolla-tube* widely cylindric, not much exceeding the calyx, and about one-third of the length of the 5 imbricate, oblong, blunt, reflexed lobes of the limb. *Style* shorter than the lobes of the limb, but exserted on account of their reflexion; clavate, grooved. *Ovary* 2-celled: cells each with a single ovule. *Fruit* globular, crowned by the small

calyx-scar, glabrous, .2 in. in diam. when dry. Seeds 2, plano-convex, the plane surface with a large pit.

KEDAH: Curtis, 2545, 2546. LANGKAWI: Curtis, 2865. PERAK: Wray, 3612.

5. WEBBERA ODORATA Roxb., Hort. Beng. 15: Fl. Ind. I, 699. A short shrub 6 to 10 feet high; young branches cinereous, sub-terete, Leaves membranous oblong-elliptic (often narrowly so), shortly acuminate, the base much narrowed; both surfaces dull, glabrous, the lower pubescent in var., deep olivaceous when dry: main-nerves 8 or 9 pairs, faint, little curved, ascending or spreading, length 5 to 8 in.; breadth 1.5 to 3 in.; petiole .4 to .8 in.; stipules triangular, acuminate, much shorter than the petioles. Cymes large terminal, paniculate, trichotomous, lax, 5 or 6 inches wide and equally long, spreading; the peduncles and branches long and slender, 4-angled, cinereous-pubescent: bracteoles linear, persistent. Flower-pedicels as long as or longer than the flowers, pubescent. Calyx urceolate-campanulate, about .1 in. long; the teeth shorter than the tube, lanceolate. Corolla-tube slender, cylindric, .25 in. long, the lobes imbricate, clavate in bud, about the same length, narrowly oblong, acute, sub-falcate, reflexed, their upper surfaces glabrous. Ovary 2-celled, each cell with 2 ovules; stigma exserted, clavate-subulate. Fruit the size of a large pea, 2-celled, 2-seeded. Hook fil. Fl. Br. Ind. III, 102. *W. macrophylla*, Roxb. l.c. 697. *Pavetta weberæfolia*, Br. in Wall. Cat. 6182 A, in part. *P. cerberæfolia*, Miq. Fl. Ind. Bat. II, 279. *Styllocoryne Webera* Wall. Cat. 8401. *S. penangensis*, Miq. l.c. 207. *Cupia macrophylla* DC. Prod. IV, 394.

PENANG: Wallich. PERAK: King's Collector 3121, 3807, 4236; Wray 1147.

VAR. *pubescens*, King; lower surfaces of leaves pubescent.

PERAK: at 3400 feet: Wray, 474.

6. WEBBERA GRANDIFOLIA, Hook. fil. Fl. Br. Ind. III. 105. A shrub or small tree: young panicles obtusely 4-angled, deciduously and minutely rusty-pubescent. Leaves thinly coriaceous, elliptic to elliptic-oblong or oblong-oblancheolate, shortly and often abruptly acuminate, much narrowed at the base: both surfaces (when dry) brown, tinged with olivaceous, the lower slightly the paler, quite glabrous; main-nerves 8 to 12 (rarely as many as 16) pairs, thin but distinct on both surfaces, spreading, curved: length 5 to 10 (rarely 12) in.; breadth 2 to 4 in.; petiole .4 to .75 in.; stipules broadly ovate, shortly acuminate, .2 to .3 in. long. Cymes as in *W. longifolia*, but on shorter peduncles and with fewer bracteoles. Calyx slightly more than .1 in. long, flask-shaped, the
but with 5 short blunt teeth. Flowers as in *W. longifolia*, but slightly

shorter, and more obovate in bud; fruit as in *W. longifolia*. *Ixora grandifolia*, Br. in Wall. Cat. 6134.

MALACCA: Griffith (K.D.) 2796; Maingay (K.D.) 854. SINGAPORE; Wallich; Ridley 1800, 3764, 10411, 10852. PERAK: Wray 3001, 3377; Ridley 5557; King's Collector 763. JOHORE: Ridley, 11167.

7. *WEBERA LONGIFOLIA*, Hook. fl. Fl. Br. Ind. III, 105. A shrub, young branches thinner than a goose-quill, obtusely 4-angled, deciduously rusty-puberulous. Leaves thinly coriaceous, oblanceolate, elliptic-oblong or elliptic-lanceolate, shortly acuminate, narrowed from the middle or above it to the short petiole; both surfaces drying olivaceous-brown; the upper glabrous and shining, the lower deciduously cinereous-puberulous, main-nerves 8 to 16 pairs, spreading, slightly prominent on the lower surface, faint on the upper, length 6 to 12 in.: breadth 2 to 3 in.: petiole $\frac{1}{4}$ to 1 in.; stipules ovate, much acuminate, hairy, about $\frac{1}{3}$ in. long. Cymes erect, terminal, paniculate, trichotomous, on rusty-pubescent obtusely 4-angled peduncles several inches (sometimes 9 or 10) in length: ultimate branchlets crowded: the flower-pedicels each with 2 linear bracteoles at its base. Calyx $\frac{1}{5}$ in. long, narrowly campanulate, divided into 5 deep linear hairy lobes as long as the tube. Corolla pubescent, about $\frac{1}{5}$ in. long; the tube cylindric, more than twice as long as the oblong obtuse lobes. Style exserted. Ovary 2-celled, each cell with one ovule. Fruit globular, glabrous, $\frac{1}{4}$ in. in diam. (when dry), crowned by the long linear calyx-lobes. *Ixora longifolia*, G. Don. Gen. Syst. III, 573. *I. macrophylla* Br. in Wall. Cat. 6165 (not of Bartl.). *Pavetta longifolia*, Miq. Fl. Ind. Bat. II, 275.

PENANG: Wallich, Phillips; Ridley, 9395; Curtis 947, 1144. PERAK: King's Collector, 2737, 3825, 6220, 6632, 10662; Wray, 2081, 2864, 2885; Scortechini, 228; Ridley, 2920. JOHORE: Ridley, 11166.

8. *WEBERA WRAYI* King, n. sp. Glabrous, except the inflorescence: young branches 4-angled, thinner than a goose-quill. Leaves thinly coriaceous, large, oblong-elliptic, shortly acuminate, cuneate at the base; both surfaces blackish-olivaceous when dry, shining, the midrib conspicuous on both, channelled on the upper; main-nerves 16 to 18 pairs, spreading, sub-horizontal, faintly visible on both surfaces; length 9 to 11 in. long; breadth 2.5 to 3.5 in.; petiole $\frac{1}{5}$ in. long, narrowly winged above. Cymes terminal, umbellately paniced, about 1.25 in. long and broad; the branches few, pubescent, slender, angled, few-flowered, the bracteoles minute: pedicels shorter than the calyx, pubescent, bracteolate. Calyx $\frac{1}{5}$ in. long, narrowly campanulate, the teeth linear-lanceolate, pubescent, erect, longer than the tube. Corolla narrowly funnel-shaped, puberulous outside, $\frac{1}{3}$ in. long: lobes linear-oblong, blunt about a third of the length of the tube. Stigma narrowly clavate, exserted,

glabrous. *Fruit* depressed globular, smooth, shining, black when dry, crowned by the small calyx-scar, .4 in. in diam. and .25 in. long. *Seeds* 2, plano-convex with a depression on the plane side.

PERAK: *Scortechini*; Wray, 2477.

9. WEBERA YAPPII, King, n. sp. Young branches thinner than a goose-quill, pale-brown when dry, glabrous. *Leaves* membranous, narrowly oblong-elliptic, acuminate, the base cuneate, both surfaces olivaceous when dry, the upper quite glabrous, the midrib slightly channelled; the lower paler, glabrous but for a few scattered adpressed pale hairs chiefly along the prominent midrib and 9 or 10 pairs of curved ascending distinct nerves: length 5 to 7 in.; breadth 1.5 to 1.75 in.; petioles .3 to .5 in.; stipules broadly lanceolate-oblong, blunt, shorter than the petiole. *Cyme* on a short peduncle, terminal, paniculate, condensed, about 2.5 in. in diam., its branches pubescent; bracteoles few, linear. *Flower-pedicels* about as long as the calyx. *Calyx* .1 in. long, narrowly campanulate, pubescent; its 5 lobes less than half as long as the tube, triangular, sub-acute, rusty-pubescent. *Corolla-tube* narrowly infundibuliform, about .4 in. long, pubescent; the 5 blunt oblong lobes of the limb imbricate in bud, reflexed where expanded, glabrous. *Style* short; stigma slightly exserted, ligulate. *Fruit* the size of a small pea, glabrous. *Seeds* 2, plano-convex.

PERAK: Yapp. 482; Wray 10.

39. IXORA, Linn.

Shrubs or small trees with terete branches. *Leaves* opposite, rarely in whorls of three, often coriaceous, rarely sessile. *Stipules* interpetiolar, often with broad bases and acuminate or linear apices, deciduous or persistent. *Flowers* in terminal trichotomously branched, often corymbose *cymes*, each bi-bracteolate, rarely 5-merous. *Calyx-tube* campanulate, often narrowly so; the limb 4-toothed, persistent. *Corolla* salver-shaped: the tube narrowly cylindric much longer than the calyx, rarely widened towards the apex, the throat naked or hairy; the limb with 4, rarely 5 spreading or reflexed lobes, twisted in bud. *Stamens* as many as the corolla-lobes, and inserted on its mouth by short filaments or sessile; anthers linear or oblong usually acuminate, the base bifid, dorsifixed, erect, more or less exserted. *Ovary* 2-celled. *Style* filiform, exserted but never twice as long as the corolla-tube. *Stigma* slender, fusiform before expansion, after expansion its two arms curved and divergent; ovules solitary, peltately attached to the septum of each cell: micropyle inferior. *Fruit* globose or didymous, with 2 plano-convex or ventrally concave coriaceous pyrenes. *Seeds* of the same shape as the pyrenes; testa membranous; albumen cartilaginous;

embryo curved; cotyledons foliaceous; radicle inferior.—DISTRIB. Species about 110; mostly tropical Asiatic and African.

Lobes of the calyx as long as, or longer than, its tube :—

Leaves hairy beneath :—

Calyx-lobes narrowly lanceolate, acuminate ... 1. *I. Brunonis*.

Leaves everywhere glabrous :—

Calyx-lobes broadly lanceolate, acute, unequal ... 2. *I. merguensis*.

Calyx-lobes broad, blunt, unequal; bracts not covering the calyces ... 3. *I. Kingstoni*.

Calyx-lobes ovate, obtuse, puberulous; bracts longer than the calyces and covering them ... 4. *I. multibracteata*.

Calyx-lobes narrowly lanceolate, about as long as the tube ... 5. *I. arguta*.

Lobes of the calyx shorter than its tube :—

Lobes acute :—

Tube of corolla 1 to 1.25 in. long :—

Leaves sessile, cordate at the base, 2 to 3 in.

long ... 6. *I. coccinea*.

Leaves elliptic to oblong-elliptic, not cordate, 6 to 9 in. long; their petioles .3 to .5 in.

long ... 7. *I. congesta*.

Tube of the corolla .25 to .3 in. long :—

Leaves oblong-elliptic, shortly petiolate, 3.5 to

5 in. long; cymes with many divergent branches 8. *I. undulata*.

Lobes blunt :—

Tube of corolla 1 to 1.25 in. long :—

Cymes pendulous on long slender peduncles 9. *I. pendula*.

Cymes not pendulous; peduncles 1 to 2 in. long :—

Main-nerves of leaves 15 to 20 pairs ... 10. *I. opaca*.

Main-nerves of leaves 8 to 12 pairs ... 17. *I. grandifolia*, var.
Kuruziana.

Tube of corolla 1 to 1.75 in. long :—

Cymes lax, spreading, leaves petiolate, acute at the base; branching shrubs (often tall) :—

Leaves thinly membranous, their main-nerves 15 to 25 pairs ... 11. *I. Lobtii*.

Leaves coriaceous, their main-nerves 10 to 12 pairs ... 12. *I. fulgens*.

Cymes not spreading, simple unbranched shrubs

1 or 2 feet high; leaves sessile, oblanceolate, cordate at the base :—

Main-nerves of leaves 15 to 18 pairs ... 13. *I. humilis*.

Main-nerves of leaves 8 to 10 pairs ... 14. *I. Scortechinii*.

Tube of corolla .8 in. long; cymes dense, 2 to 3 in.

in diam. ... 15. *I. stricta*.

Tube of corolla .4 in. long; cymes lax, slightly branched, 1 to 1.5 in. long ... 16. *I. concinna*.

Tube of corolla .2 to .4 in. long:—

Cymes 2 to 4 in. across, branched, spreading:—

Leaves coriaceous; cymes branched from the base ... 17. *I. grandifolia*.

Leaves membranous; cymes on long slender naked peduncles 3 to 4 in. long ... 18. *I. diversifolia*.

1. *IXORA BRUNONIS*, Wall. Cat. 6136. A shrub; young branches thicker than a crow-quill, covered with short cinereous-brown tomentum. *Leaves* thinly membranous, sessile, oblanceolate, sometimes sub-panduriform, shortly caudate-acuminate, tapering much to the rounded or minutely cordate base; upper surface with the interspaces shining and glabrous, the depressed midrib and 10 to 12 pairs of rather faint curved ascending main-nerves minutely tomentose; lower surface with minute spreading pubescence especially on the prominent midrib, main-nerves and reticulations, length 5 to 10 in.; breadth 1.5 to 2.25 in.; stipules with broad ovate bases with stout midribs, and long thin linear apical tails, length (including the tails) .5 in. *Cymes* about 1.5 in. long, 12- to 20-flowered, on short tomentose peduncles, 4 to 6 collected in corymbs on the apices of the branches, their bracteoles filiform and hairy. *Flowers* sessile; calyx .15 to .2 in. long, narrowly campanulate, the 4 teeth narrowly lanceolate, acuminate, as long as the tube. *Corolla* 1 to 1.5 in. long, externally with long cinereous spreading deciduous hairs, ultimately nearly glabrous; the tube very narrowly cylindric, glabrous and ridged inside, the throat hairy: limb .5 in. across, its lobes 4, oblonge-elliptic, acute, spreading or reflexed, quite glabrous on the upper surface, sparsely hairy on the lower. *Anthers* elongate, narrow, acuminate, deflexed, longer than their filaments. *Stigma* slender, slightly exserted. *Fruit* ovoid, puberulous, .35 in. long, and .25 in. in diam. when dry. G. Don Gen. Syst. III. 573; Kurz Flora Burm. II. 20; Hook fil. Fl. Br. Ind. III. 139. *Pavetta Brunonis*, Miq. Fl. Ind. Bat. II, 270 (not of Wight Icon.)

PENANG: Wallich, (6136); Phillips; Ridley, 7682. PERAK: Wray, 3478, 3524; King's Collector, 1658. SINGAPORE: Lobb. MALACCA: Main-gay (K.D.) 858. DISTRIB. Burma; Wall. Cat. 8447.

2. *IXORA MERGUENSIS*, Hook fil. Fl. Br. Ind. III. 140. A robust shrub only 2 or 3 feet high, glabrous; stem as thick as a swan's-quill, compressed, cinereous. *Leaves* large, coriaceous, elliptic-oblong or obovate, abruptly and shortly acuminate, the base very cuneate: both surfaces olivaceous and dull; when dry the lower paler and reticulate; main-nerves 10 to 14 pairs, slender, slightly curving upwards; length 7 to 12 in.; breadth 2.25 to 4 in.; petioles .5 to 1 in., stout, channelled. *Cyme*

globose, sub-sessile, terminal, with numerous very short branches, about 3 in. in diam., dense, many-flowered, pedicellate, each flower with a lanceolate small bract. *Calyx* .15 in. long, campanulate, the 4 lobes of the limb unequal, broadly lanceolate, acute, somewhat longer than the tube. *Corolla-tube* puberulous, .6 in. long, cylindric, narrow below, somewhat wider above; the limb .6 in. across; its lobes oblong, broad, blunt, spreading, the throat with a few hairs. *Anthers* sub-sessile, narrow, apiculate. *Fruit* unknown.

MALAY PENINSULA: *Griffith* (K.D.) 3003. PUNGAH: *Curtis*, 2961. PERAK: *Wray*, 3543?

Mr. Curtis has sent from Pungah two specimens bearing the number 2961, one in Herb Kew and the other in Herb. Calcutta. The one in Herb. Calcutta is typical *I. merguensis*; that in Kew forms the variety described below.

VAR. *Curtisii*, King & Gamble; *leaves* narrowly elliptic-oblong, not at all obovate; nerves about 14 pairs, curving upwards, distinct on both surfaces; length 14 in.; breadth 4.25. *Corolla-tube* about .8 in. long, cylindric, widening upwards, puberulous; its limb nearly 1 in. across; the lobes ovate-lanceolate, sub-acute, the throat hairy.

PUNGAH: *Curtis*, 2961.

3. *IXORA KINGSTONI*, Hook. fil. Fl. Br. Ind. III, 140. A shrub or small tree: young branches as thick as a duck's quill, terete, smooth and dark-coloured when dry. *Leaves* thinly membranous, shining and of a pale warm-brown colour when dry; glabrous, oblong or elliptic-oblong, sometimes oblanceolate, the apex with a short usually blunt point, tapered from below the middle to the short petiole; the reticulations slender; main-nerves 15 to 18 pairs, slender, spreading; length 5 to 9 in.; breadth 2 to 3 in.: petiole .4 to .5 in. channelled; stipules semilunar, broad but only about .1 to .15 in. long, the apex bearing a short bristle. *Cymes* 4 to 6, in a dense terminal corymbose panicle 3 or 4 in. in diam., each on a puberulous bracteate peduncle about .5 in. long (longer in fruit) and bearing numerous bibracteolate flowers, the bracts and pairs of bracteoles ovate-lanceolate, subcoriaceous, sub-acute, more or less persistent. *Flowers* 4-merous, sessile, crowded. *Calyx* .2 to .3 in. long; the tube short, narrow; the limb with 4 large deep broad blunt lobes longer than the tube, one usually longer than the other 3 and resembling the bracts and bracteoles in texture. *Corolla-tube* 1 to 1.25 in. long, slender, cylindric, glabrous; the limb .5 to .6 in. across, the lobes broadly obovate, obtuse, spreading. *Anthers* narrow, apiculate, reflexed, longer than their filaments. *Stigma* slightly exserted, small. *Fruit* ovoid, puberulous, crowned by the persistent calyx-lobes; length (including calyx-lobes) .7 in.: diameter .3 to .4 in. (when dry).

MALACCA: Griffith (K.D.) 2996; Goodenough, 1271. PERAK: *Scortechini*, 2030; Wray, 626; King's Collector, 733, 871, 920, 932, 2540, 3167, 4200, 5972. SELANGOR: *Ridley*, 3674, 7300; *Curtis*, 2346. JOHORE: *Curtis*.—DISTRIB. Andaman Islands.

The corolla, according to Kunstler, is yellowish-red. The Andamanese specimens look slightly different, and may belong to a new species. Fruit of the Andaman plant is wanting.

4. *IXORA MULTIBRACTEATA*, H. H. W. Pearson in Kew Bull. ed. A bush or small tree, all parts glabrous except the inflorescence; young branches thinner than a goose-quill, somewhat compressed, pale when dry. *Leaves* membranous, pale yellowish-green when dry, oblong-ob lanceolate to oblong-elliptic, shortly and bluntly acuminate, much narrowed to the base; both surfaces finely reticulate, main-nerves 10 to 16 pairs, slightly curved, spreading, faint on both surfaces; length 5 to 9 in.; breadth 1.5 to 3 in.; petiole .3 to .6 in.; stipules cupular, only about .1 to .15 in. long, shortly apiculate. *Cymes* axillary and terminal, from 2.5 to 5 in. in diam. with many spreading ridged glabrous branches, and a peduncle less than 1 in. long; bracts at the bases of the branchlets broad, blunt, from .2 to .3 in. long; ultimate branchlets with numerous imbricate ovate-triangular sub-cordate obtuse puberulous 1-nerved bracts .2 in. long at their bases, and 3 to 5 flowers nearly 1.5 in. in length; flower bracteoles ovate-obtuse, nerved, about .15 in. long. *Calyx* sessile, about .25 in. long, puberulous, its lobes 4, ovate, obtuse. *Corolla-tube* puberulous outside, glabrous within, narrowly cylindric, 1 in. to 1.25 in. long: its limb nearly .5 in. across: the 4 lobes oblong, blunt, glabrous. *Anthers* longer than the very short filaments, narrowly oblong, short, apiculate, the base sagittate. *Fruit* unknown.

MALACCA: *Maingay* (K. D.) 856. PUNGAH: *Curtis* 2954. LANKAWI: *Curtis* 3408. ANDAMANS: *Helfer* (K. D.) 2997. PERAK: *Scortechini*; Wray 3317. QUEDAH: *Ridley* 5540.

A species allied to *I. Kingstoni*, Hook. fil., but with less membranous leaves. It is readily distinguished by the numerous bracteoles at the bases of the flowers and by the large imbricate bracts at the bases of the ultimate branchlets.

5. *IXORA ARGUTA*, Br. in Wall Cat, 6157. A tree; all parts except the inflorescence glabrous; young branches much thinner than a goose-quill, obtusely 4-angled, glabrous, dark-coloured. *Leaves* thinly coriaceous, broadly oblanceolate, rarely obovate or elliptic, rather abruptly and shortly acuminate, the base much narrowed, both surfaces drying very dark-brown, almost concolorous, shining; main-nerves 6 or 7 pairs, curved, spreading, faint on both surfaces; length 3.5 to 6 in.; breadth 1.5 to 2.25 in.; petiole .2 to .4 in.; stipules lanceolate, linear-acuminate,

shorter than the petiole. *Cymes* solitary, terminal on peduncles 1·9 to 3 in. long, spreading, trichotomous, many-flowered, the bracteoles linear, persistent. *Flower-pedicels* shorter than the narrowly campanulate calyx. *Calyx* less than 1 in. long, narrowly campanulate, its 4 or 5 narrowly lanceolate acute teeth as long as the tube, erect. *Corolla-tube* narrowly cylindric, 4 or 5 in. long: the limb with 5 oblong apiculate lobes 2 in. long. *Stigma* narrowly fusiform (before the expansion of its lobes), slightly exserted. *Fruit* like a small pea if one-seeded; broader and with two vertical grooves if two-seeded, crowned by the small scar of the calyx, glabrous, smooth. *I. nigricans*, Hook. fl. Fl. Br. Ind. III. 149, var. *arguta*. *I. nigricans*, Wall. Cat. 6154 B. and C. only.

PERAK: Wray 2135, Curtis 1303, 980; Kings Collector 684, 870, 2072, 4286, 4573, 4966, 8718, 10269, 10658, 10901; *Scortechini*. KEDAH: Ridley 8299. SELANGOR: Ridley 8240. WELLESLEY: Ridley 7013; Curtis, 2451, 3206. MALACCA: Maingay (K.D.) 859.

The type specimens of this in the Wallichian Catalogue consist of two sheets distinguished by the letters A and B. The former was received from Herb. Heyne, and is therefore supposed to have come from Southern India. Sheet B is attributed to Penang. What appears to be the same plant but with somewhat broader leaves also forms B and C of No. 6154 which was distributed under the name *I. nigricans*, R. Br. Under this name (*I. nigricans*, R. Br.) there were unfortunately issued by Wallich two other plants lettered respectively 6154 A and D. These two not only differ from B and C, but also from each other. The name has however been adopted in the Flora of British India and the Wallichian No. 6154, without distinction of letters, has been taken as its basis. As the simplest solution of the confusion which has thus arisen, I have ventured to restore the MSS. name *I. arguta*, R. Br. for the plant—a common one in all the provinces—above described.

6. *IXORA COCCINEA* Linn. Sp. Pl. 159 (excl. syn.) A much branched shrub, the smaller branches of the cymes and the calyces puberulous, otherwise quite glabrous; young branches thinner than a goose-quill, pale. *Leaves* coriaceous, pale when dry, broadly ovate or elliptic, sessile, the base cordate and stem-clasping or slightly narrowed; the apices sub-acute or blunt and mucronate; nervation indistinct when dry; length 2 to 3 in.; breadth 1·25 to 1·75 in.; stipules narrowly semilunar with long straight linear stiff apices. *Cymes* several together, at the apices of the branches, each on a short peduncle, minutely bracteate and bracteolate; *calyx* less than 1 in. long, puberulous cylindric, with 4 acute teeth shorter than the tube. *Corolla-tube* 1·25 to 1·5 in. long, narrowly cylindric; the 4 lobes of the limb broad, acute, spreading, 25 in. long. *Fruit* fusiform, sometimes pulpy. Roxb. Fl. Ind. I, 375; W. & A. Prod. Fl. Pen. Ind. 427; Wight Icon. 153; Brand. For. Flora 275; Kurz. For. Flora, Burma II, 26; Hook. fl. Fl. Br. Ind.

III, 145. *I. grandiflora*, Br. in Bot. Reg. t. 154; DC. Prod. IV, 486. Wight in Hook. Bot. Misc. III. Suppl. t. 35. *I. propinqua*, Br. in Wall. Cat. 6119. *I. incarnata*, DC. Prod. l.c. *I. obovata*, Heyne in Roth Nov. Spec. 90. *I. Bandhuca*, Roxb. Hort. Beng. 10; Fl. Ind. I. 376; Wall. Cat. 6120; DC. Prod. l.c.; Wight l.c. 149. *Pavetta coccinea* and *P. incarnata*, Blume Bijdr. 950. *P. Bandhuca*, Miq. Fl. Ind. Bat. II, 266.

In most of the provinces; cultivated on account of its brilliant scarlet flowers.

7. *IXORA CONGESTA*, Roxb. Fl. Ind. I 387. A shrub, glabrous except the smaller branches of the cymes; young branches half as thick as a goose-quill, dark-coloured. Leaves thinly coriaceous, elliptic to oblong-elliptic, sub-acute or shortly and bluntly acuminate, the base rounded or cuneate; both surfaces brown when dry and rather dull, the lower paler; main-nerves 12 to 20 pairs, spreading and interarching at the tips, depressed on the upper and prominent on the lower surface; length 6 to 9 in.; breadth 2.25 to 4 in.; petioles .3 to .5 in.; stipules .15 in. long, broad, shortly cuspidate. Cyme terminal, corymbiform, trichotomous on a short peduncle, 2.5 to 4 in. long (including the peduncle) and rather more in diam., condensed, the branches many-flowered. Calyx sessile or on a short pedicel, less than .1 in. long, with 4 triangular acute teeth shorter than the tube. Corolla-tube 1.25 to 1.5 in. long, narrowly cylindric; its limb .5 or .6 in. across, its 4 lobes spreading or reflexed, ovate-lanceolate, blunt or sub-acute, .25 to .3 in. long; stigma slender, slightly exserted. Fruit compressed, fusiform, with 2 vertical grooves, glabrous. DC. Prod. IV, 486; Wall. Cat. 6138. Hook. fil. Fl. Br. Ind. III, 146. *I. Griffithi*, Hook. Bot. Mag. t. 4325. *I. fulgens*, Wall. Cat. 6512 B. *Pavetta congesta*, Miq. Fl. Ind. Bat. II, 269.

SINGAPORE: Lobb; Anderson 92; Ridley 5674, 6911. JOHORE: King, Ridley 4168. MALACCA: Griffith (K.D.) 2984; Maingay (K.D.) 848; 848-2; Ridley 5675, 6911; Derry 8; Goodenough 1967. PENANG: Wallich; King; Curtis 1729, 1730, 2265, 2975. PERAK: Scortechini; King's Collector 675, 2448 2865, 2867, 3982, 3998; Wray. DISTRIB.—Malayan Archipelago, Burma.

Allied to *I. Lobbii*, Loud. but with more coriaceous broader leaves, with more nerves, shorter flowers in more condensed cymes. The corolla is orange or red.

8. *IXORA UNDULATA*, Roxb. Hort. Beng. 10; Fl. Ind. I, 385. A glabrous shrub or small tree, the cymes often pubescent; young branches thinner than a goose-quill, pale-brown, shining. Leaves coriaceous, oblong-elliptic, sub-acute, the base much narrowed; both surfaces olivaceous-brown when dry, rather dull; main-nerves about 12 pairs, thin

but distinct on both surfaces, curved, spreading; length 3·5 to 5 in.; breadth 1·25 to 2 in.; petioles ·3 to 4 in., stipules triangular, acuminate, ·2 in. long. *Cymes* nearly as long as the leaves, almost sessile, branching from near the base, the branches divergent, trichotomous, many-flowered, the bracteoles few and minute, lanceolate. *Calyx* sessile, less than ·1 in. long, cylindric, with 4 ovate-acute teeth. *Corolla-tube* ·25 to ·3 in. long, narrowly cylindric; the limb ·2 in. across, its 4 lobes narrowly oblong, blunt, reflexed. *Fruit* (in Indian specimens) fusiform, smooth. Roth Nov. Spec. 91; DC. Prod. IV, 488; Wight & Arn. Prod. 428; Wight Icon. 708; Hook. fil. Fl. Br. Ind. III, 147; Wall. Cat. 6129, excl. *Herb. Ham. I. canja*, Wall. Cat. 6130.

PERAK: at elevation of 4000 feet; Wray 3934.

Only once collected in our region. A common species at the base of the eastern Himalaya, and in the Khasia Hills.

9. *IXORA PENDULA*, Jack in Mal. Misc, I, 11. A small shrub, all parts glabrous except the branches of the inflorescence; young branches thinner than a goose-quill. *Leaves* thinly coriaceous, oblong to elliptic-oblong, sometimes slightly oblanceolate, sub-acute, the base more or less cuneate, both surfaces pale-olivaceous when dry, smooth, the upper shining, the reticulations fine, not prominent; main-nerves 12 to 16 pairs, curved, ascending, faint on the upper surface, thin but prominent on the lower; length 9 to 11 in.; breadth 2·5 to 3·5 in.; petiole ·5 to ·75 in., stout, channelled: stipules about ·2 in. long, broadly ovate, abruptly acuminate. *Cymes* terminal, 3-branched, pendulous, often nearly as long as the leaves (half the length being slender peduncle): branches puberulous trichotomous, with subulate bracts at the divisions; ultimate branchlets with about 9 flowers. *Calyx* under ·1 in. in length, with 4 short blunt teeth. *Corolla-tube* slender, cylindric, about 1·25 in. long, the limb about ·4 in. across, the 4 lobes oblong, blunt, reflexed. *Anthers* short, narrow, acute, sagittate at the base, longer than their filaments. *Stigma* slightly exserted. *Fruit* ellipsoid, blunt, smooth, ·3 in. long and ·25 in. in diam. Hook. fil. Fl. Br. Ind. III. 141.

In all the provinces, common.

The flowers of this are rose-coloured. The long slender drooping peduncle of the cyme has often a whorl of lanceolate bracteoles near the base, and the upper leaves of the stem are often much reduced in size. There are specimens in which the peduncle of the cyme is only 2 or 3 inches long, but usually it is twice as long.

10. *IXORA OPACA*, Br. in Wall. Cat. 6141. A small shrub, glabrous except the puberulous branches of the cyme; young branches thinner than a goose-quill, pale-brown. *Leaves* thickly membranous, oblong to elliptic-oblong, obtusely and shortly acuminate, the base rounded or

cuneate; both surfaces olivaceous when dry; the upper dark and shining; the lower paler, much reticulate, and dull; main-nerves 15 to 20 pairs, spreading, curved, prominent on the lower surface; length 4 to 7 in.; breadth 1.25 to 2.5 in.; petioles .3 to .5 in.; stipules triangular with broad bases and long linear points. Cyme corymbose, with many short spreading branchlets, sometimes laxly trichotomous, 2.5 to 5 in. across, terminal, on a slender erect peduncle 1 or 2 in. long. Flowers as in *I. pendula*, but smaller, the limb of the corolla being only .3 in. across. Fruit as in *I. pendula*, Jack. G. Don, Gen. Syst. Gard. III. 573. Hook. fil. Fl. Br. Ind. III. 147. *Pavetta opaca*, Miq. Fl. Ind. Bat. II. 270.

MALACCA: Ridley 966. PENANG: Curtis 3385. PERAK: Wray 3447: King's Collector 2699, 2805, 2829, 2917, 4061; Ridley 3071.—DISTRIB. Burma, Sumatra.

A species closely allied to *I. pendula*, Jack, but the cymes have shorter peduncles and the leaves are narrower.

11. *IXORA LOBBII*, Loudon, Encycl. Supplem. II, 1543. A shrub, everywhere glabrous except the smaller branches of the inflorescence and the calyces; youngest branches as thick as a duck's quill, dark-coloured, shining. Leaves thinly membranous, oblong, oblong-lanceolate or elliptic-oblong, rarely oblanceolate, the apex acute or shortly acuminate, the base cuneate; both surfaces rather pale-brown when dry and shining; main-nerves 15 to 25 pairs, rather straight, spreading, inter-arching at the tips, slender but distinct on the lower surface, very faint on the upper; length 5 to 8 in.; breadth 1.25 to 2 in.; petioles .2 to .3 in.; stipules triangular, acuminate, about .15 in. long. Cymes terminal, corymbose, shortly pedunculate, 3 to 8 in. across, the bracts and bracteoles minute, lanceolate, deciduous. Calyx cylindric-campanulate, less than .1 in. long, its 4 broad blunt lobes shorter than the tube. Corolla-tube slender, cylindric; 1 to 1.75 in. long; the limb .4 to .5 in. across; its 4 lobes narrowly oblong, blunt or sub-acute, spreading; stigma slender, slightly exserted. Fruit ellipsoid, blunt, .25 to .3 in. long and .25 to .3 in. in diam. (when dry), smooth. *I. fulgens*, Hook. fil. Fl. Br. Ind. (not of Roxb.) in part. *Pavetta Lobbii*, Teyssm. & Binn. in Miq. Ann. Mus. Lugd. Bat. IV. 194.

MALAYAN ARCHIPELAGO; Helfer (K.D.) 2998. MALACCA: Griffith (K.D.) 2985; Maingay (K.D.) 845; Derry 10, 966; Cuming 2396. PENANG: Curtis 479; Lobb. WELLESLEY: Ridley 6991. PERAK: Wray 476, 952, 2891, 3449; King's Collector 407, 2374, 2908, 3828, 4196, 5626, 5698; Scortechini 96, 349. SINGAPORE: Lobb; King; Ridley; Anderson 94. KEDAH: Curtis 2659.—DISTRIB. Malay Archipelago.

VAR. *angustifolia*, King & Gamble; leaves narrowly oblong-lanceolate about 1 in. in width.

SINGAPORE: King. PERAK: Wray 519; Scortechini 1893; King's Collector 2718. PAHANG: Ridley 2215.

This variety comes near to *Pavetta salicifolia*, Blume, but its leaves have more numerous main-nerves, and its corolla lobes are much shorter.

12. *IXORA FULGENS*, Roxb. Hort. Beng. 10: Fl. Ind. I. 378. A shrub, all parts glabrous: young branches thicker than a crow-quill, dark, shining. Leaves coriaceous, oblong-lanceolate or oblanceolate, shortly acuminate, the base cuneate; both surfaces shining when dry, the upper dark-brown, the lower paler; main-nerves 10 to 12 pairs, curved, spreading, interarching, slender; length 3·5 to 5·5 in., breadth 1·25 to 1·5; petiole ·2 to ·3 in.; stipules ·2 in. long, triangular, the base broad, with a long linear point. Cymes terminal, corymbose, rather lax, spreading, ·3 to ·5 in. in diam., many-flowered; bracteoles triangular, minute. Calyx less than ·1 in. long, cylindric-campanulate, with 4 shallow broad teeth. Corolla-tube 1·25 to 1·5 in. long, narrowly cylindric; its limb ·8 in. across; the 4 lobes broadly ovate or lanceolate, acute, spreading. Anthers narrow, on short filaments. Fruit fusiform, somewhat 2-lobed, smooth, purple when ripe. DC. Prod. IV, 486: Wight Icon. 451: Wall. Cat. 6152; Hook. fil. Fl. Br. Ind. III. 146, *not of Roxb.*

SINGAPORE: Lobb 102. PERAK: Scortechini; Wray 3024; King's Collector 2949, 5075, 5522.

This species is not common. It has been confused with the much more common *I. Lobbii*, Loud. from which it differs in having about half as many leaf-nerves. It is to *I. Lobbii* that the description of *I. fulgens* given in the Flora of British India really refers.

13. *IXORA HUMILIS*, King & Gamble, n. sp. A small unbranched glabrous shrub little more than a foot high. Leaves large, coriaceous, sessile, elliptic to sub-panduriform, the apex sub-acute, narrowed below the middle to the broadly cordate auriculate base; both surfaces brown when dry, the lower paler and with the reticulations distinct; main-nerves 15 to 18 pairs, curved, slender but distinct, spreading and only slightly curved: length 9 to 12 in.; breadth 3·5 to 4 in.; stipules of opposite sides united into a short tube with a cusp on each side. Cyme terminal, 2·5 to 3 in. long (including the short peduncle), and as much across; branches few and short, bracteoles minute. Calyx under ·1 in. long, its lobes shorter than the tube, blunt. Corolla-tube about 1·5 in. long, narrowly cylindric; the limb about ·7 in. across; its 4 lobes sub-rotund, spreading. Anthers linear, apiculate, on short filaments inserted in the throat. Fruit unknown.

PENANG: *Curtis* 400. SELANGOR: *Ridley* 7422a. PERAK: *Wray* 4157; *Ridley* 7186; *Yapp* 204; *Scortechini*.

A distinct species distinguished by its short bushy habit, and its large leaves tapered to a broad cordate-auriculate base.

14. *IXORA SCORTECHINI*, King & Gamble, n. sp. An unbranched shrub about a foot in height: the stem as thick as a goose-quill, pale-brown, rather rough. *Leaves* large, almost sessile, coriaceous, broadly oblanceolate, sub-acute or blunt, narrowed from about the middle to the rounded or cordate base; upper surface brown when dry and somewhat shining; the lower pale, reticulate and dull; main-nerves 8 to 12 pairs, slightly prominent on both surfaces, curving upwards, interarching; length 5.5 to 9 in.; breadth 2 to 3 in.; petioles about .1 in. long or absent; stipules very short, broadly triangular and with an abrupt linear point. *Cymes* terminal, about 2 in. long (including the short peduncle), the branches short, puberulous. *Calyx* nearly .1 in. long, cylindric, with 4 very broad short blunt teeth. *Corolla-tube* 1 to 1.25 in. long, narrowly cylindric, glabrous; the limb .5 in. across with 4 blunt broad oblong spreading lobes. *Fruit* fusiform, deeply 2-grooved, smooth.

PENANG: *Curtis* 400. PROVINCE WELLESLEY: *Ridley* 6992. PERAK: *Scortechini* 1277; *Wray* 4157; *King's Collector* 3120.

15. *IXORA STRICTA*, Roxb. Hort. Beng. 10: Fl. Ind. 1, 379. A large shrub, everywhere glabrous: young branches thicker than a crow-quill, dark-brown, shining. *Leaves* thinly coriaceous, lanceolate or elliptic, lanceolate, rarely elliptic, acute or acuminate, the base cuneate; upper surface olivaceous when dry, the lower brown; main-nerves 7 or 8 pairs: obsolete on the upper surface, faint and interarching on the lower; length 2.5 to 5 in.; breadth 1.25 to 2 in.; petiole .15 to .2 in.; stipules .2 in. long, triangular, with broad bases and long linear points. *Cymes* almost sessile, terminal, corymbose, dense, 2 or 3 in. in diam., bracteoles minute. *Calyx* under .1 in. long, cylindric, broadly 4-lobed or sub-entire. *Corolla-tube* narrow, cylindric, .8 in. long; the limb .4 in. across, its 4 lobes oblong, sub-acute or obtuse, spreading or reflexed. *Fruit* broadly fusiform, smooth. DC. Prod. IV. 486; W. & A. Prod. 427; Wight Ic. 184; Kurz For. Fl. Burma, II. 26; Wall. Cat. 6123; Hook. fil. Br. Ind. III. 145. *I. coccinea*, Bot. Mag. 169. *I. alba*, Roxb. II. cc.; Wight Ic. 707. Wall Cat. 6122. *I. blanda*, Ker in Bot. Reg. t. 100; DC. I. c., 487. *I. incarnata*, Roxb. Fl. Ind. I. 379; DC. l.c. 486. *I. crocata*, Lindl. in Bot. Reg. t. 782; DC. l.c. 486. *I. rosea*, Wall. Cat. 6124; Bot. Mag. t. 2428, (not of Wall. in Roxb. Fl. Ind. I. 398). *I. amoena*, Wall. Cat. 6121 D.E.F.G.; Don, Gen. Syst. III. 571; Hook. fil. Fl. Br. Ind. III. 146. *I. densa*, Wall. Cat. 6150, in part.

MALACCA: *Griffith* (K.D.) 2986; *Maingay* (K.D.) 846, 846 $\frac{1}{2}$, 849; *Goodenough* 1753; *Derry* 257. PERAK: *Wray* 3293, 3448; *King's Collector* 2247, 3978; *Scortechini*. PAHANG: *Ridley* 2227. SINGAPORE: *Ridley* 5004; *Lobb*. PENANG: *Wallich*; *Curtis* 1122; *Deschamps*. KEDAH: *Ridley* 7092. DINDINGS: *Ridley* 7187.—DISTRIB. British India, Burmah.

Owing to the beauty of its flowers this species is much cultivated in gardens. But it also occurs in a wild state. The corolla is usually scarlet, but individuals with white, rosy, or yellowish corollas are frequent. As regards leaves the species varies somewhat. I can find nothing except the slightly different reticulation of the leaves to distinguish *I. amoena*, Wall., and I have therefore reduced it here. In the Flora of British India, Sir Joseph Hooker, without actually making the reduction, expresses himself in favour of it.

16. *IXORA CONCINNA*, Br. in Wall. Cat. 6149. A shrub, all parts glabrous: young branches slightly thicker than a crow-quill, pale-brown. Leaves thinly coriaceous, elliptic-oblong or elliptic-oblongate, very shortly and rather bluntly acuminate, the base cuneate: both surfaces slightly shining when dry, olivaceous-brown, the lower the paler; main-nerves 8 or 9 pairs, slender, slightly depressed on the upper and prominent on the lower surface; length 2.5 to 5 in.; breadth 1 to 1.75 in.; petioles .15 to .25 in.; stipules triangular, .2 in. long with broad bases and long stiff linear apices; a few of the upper leaves much reduced in size. Cymes (including their peduncles) from 1 to 1.5 in. long, three or four collected at the apex of a branch, each 5- or 6-flowered; bracteoles minute. Calyx under .1 in. long, campanulate, with 4 broad teeth shorter than the tube. Corolla-tube about .4 in. long, narrowly cylindric; the limb about .3 in. across, its 4 lobes oblong, spreading, blunt. Fruit about as large as a small pea, broader than long, deeply 2-grooved, glabrous. Hook. fil. Fl. Br. Ind. III. 647. *Rubiacea*, Wall. Cat. 8449.

SINGAPORE: *Wallich*; *Ridley* 8451. MALACCA: *Griffith*; *Lobb* 189; *Maingay* (K.D.) 847; *Derry* 962. PERAK: *Scortechini* 174; *Wray* 1317; *King's Collector* 3068, 3978, 3530, 4639, 5648.

17. *IXORA GRANDIFOLIA*, Zoll. & Mor. Syst. Verz. 65. A bush or small tree, quite glabrous or with the cymes puberulous; young branches pale-brown when dry, not so thick as a goose-quill (paler and thinner in some vars.). Leaves large in the typical form, sub-coriaceous, elliptic, ovate (oblong or lanceolate in vars.), obtuse or acute, the base cuneate or broadly rounded, sometimes (in vars.) minutely cordate, both surfaces brown when dry, shining, obscurely reticulate; main-nerves 8 to 12 pairs, not usually very prominent on either surface: length 8 to 10 in. (less in var. 3), breadth 3 to 5 in. (less in var. 3), petiole .5 to .75 in. stout (shorter in some vars.); stipules broad, .35 in. long, cuspidate

or sometimes bifid. *Cymes* varying, always pedunculate, laxly trichotomous, or in var. 2 densely crowded, 3 or 4 in. across (much less in var. 2) the branches cinereous-puberulous. *Flowers* crowded, shortly pedicellate, glabrous, about .5 in. long, (longer in vars.). *Calyx* under .1 in. long, with 4 blunt teeth shorter than the tube. *Corolla-tube* cylindric, slender, .35 in. long. (longer in vars. 2 and 4), the limb with 4 broad blunt oblong reflexed lobes .15 in. long: stigma narrowly clavate in bud. *Fruit* broadly fusiform, smooth. Hook. fil. Fl. Br. Ind. III. 143. *I. elliptica*, Br. in Wall. Cat. 6153.

MALACCA: *Griffith*; *Maingay* (K.D.) 843. PENANG: *Wallich* 6153. PERAK: *King's Collector* 410, 4083, 4756; *Scortechini* 1368.—DISTRIB. Nicobars, *Kurz*.

A very variable species of which the following forms may be distinguished. The corolla is white.

VAR. 1 *gigantea*, King & Gamble. A tall tree, leaves very coriaceous, elliptic, obtuse at base and apex, 7 to 10 in. long and 3 to 5 in. broad; cymes (including their peduncles) 3 to 7 in. long, with spreading puberulous branches; corolla about .5 in. long.

PENANG: *Curtis*, 3384. SINGAPORE: *Ridley*, 4120. PERAK: *Wray* 2973, 3678, 3971; *King's Collector* 5609, 5466, 10294. ANDAMANS; *Heinig* 22.

This may be separable as a species. More specimens (in flower) are wanted.

VAR. 2 *coriacea*, Hook. fil. Fl. Br. Ind. III. 143 (excl. syn. *I. macro-siphon*); leaves very coriaceous, oblong-lanceolate or oblong-elliptic, sub-acute, the base cuneate; length 8 to 10 in.; breadth 2.5 to 3 in.; cymes (including their peduncles) 3 in. long or less. *Corolla* about .6 in. long. *I. coriacea*, Br. in Wall. Cat. 6151.

PENANG AND SINGAPORE: *Wallich*; *Curtis* 2486. MALACCA: *Griffith* in Herb. Wight, (K.D.) 2999; *Maingay* (K.D.) 844. PERAK: *Wray* 2140, 2626; *King's Collector* 5935. PAHANG: *Ridley* 2213.—DISTRIB. Andaman Islands.

There is in Herb. Calcutta a single specimen (in flower only) collected by *Ridley* in Pahang (Herb. *Ridley* 2213) which in most of its characters resembles this. The texture of the leaves and their nervation are however slightly different, and the flowers are somewhat longer and in less spreading cymes.

VAR 3 *arborescens*, Hook. fil. l.c.; branches thinner than a goose-quill, the bark very pale; leaves sub-coriaceous, only 4 to 6 in. long, and from 2 to 2.5 in. broad; sub-obtuse at the apex and broadly rounded at the base, the petiole only .3 to .4 in. long; cymes (including peduncle) 3 to 7 in. long, the branches long and spreading; corolla little more than .5 in. long. *I. arborescens*, Hassk. in *Retzia* I. 22.

MALACCA: *Griffith* Herb. Wight, (K.D.) 2987; *Derry*, 310, 571; 156

Cumming 2332. PERAK: *King's Collector* 4686. JOHORE: *Ridley* 4165.
—DISTRIB. Andaman Inlands.

VAR. 4 *Kurzeana*, Hook. fil. l.c.; leaves sub-coriaceous, elliptic to elliptic-oblong, the apex acute; the base rounded or cuneate; corolla 1·25 in. long. *I. Kurzeana*, Teysm. & Binn. in Nat. Tijds. Ned. Ind. 100. *I. macrosiphon*, Kurz in Trimen Journ. Bot. 1875, 327; For. Flora Burm. II. 24.

ANDAMAN ISLANDS: *Kurz*, *Prain's Collector*. SUMATRA, JAVA, &c.

18. *IXORA DIVERSIFOLIA*, Wall. Cat. 6146. A shrub or small tree, the branches of the inflorescence slightly puberulous, otherwise glabrous; young branches thinner than a goose-quill, pale when dry. Leaves membranous, oblong to broadly elliptic, acute or sub-acute, the base rounded or cuneate; the upper pair sometimes sessile and sub-cordate, often reduced in size, the majority with stout petioles ·3 or ·4 in. long; both surfaces smooth, shining, brown when dry; main-nerves 10 to 12 pairs, curved, spreading, prominent as the lower surface; length of blade 4 to 10 in.; breadth 2 to 4 in.; stipules elongated-triangular, ·25 in. long (sometimes longer and sometimes blunt). Cyme 3 to 4 in. in diam. (its slender peduncle included) 3 to 6 in. long, trichotomous; the ultimate branchlets minutely bracteolate at the divisions, 2- to 3-flowered. Flowers ·4 to ·6 in. long, mostly on short puberulous pedicels, some sessile, glabrous. Calyx less than ·05 in. long, the 4 teeth shorter than the tube, blunt. Corolla-tube narrowly cylindric, very short in the bud, afterwards lengthening to ·2 to ·4 in.; sometimes longer, lobes of the limb 4, narrowly oblong, sub-acute, much reflexed, ·2 in. long. Stigma exserted, clavate at first, the arms afterwards divergent. Fruit ellipsoid, blunt, ·3 in. long and ·2 in. diam. (when dry) glabrous. Kurz. For.; Flora Burm. II. 22; Hook. fil. Fl. Br. Ind. III. 141.

PENANG: *Curtis*, 2486. PERAK: *King's Collector* 5691, 5737, 5896; (*Wray* 3491 ?); *Scortechini* 168.—DISTRIB. Burma; *Griffith* (K.D.) 2992.

The corolla of this is much shorter than those of *I. pendula*, and it is white and the leaves are often broader. The two species are closely allied. A form collected in Perak by *Wray* (No. 3491) connects the two, combining the longer corollas and peduncles which are characteristic of *I. pendula* with the general facies of *I. diversifolia*.

40. PAVETTA, Linn.

Characters of *Ixora*, but the style very slender and much longer than (often twice as long as) the corolla-tube; the stigma not thicker and sometimes even thinner than the style and usually entire; the stipules larger and sheathing, especially those of the lower part of the

inflorescence; leaves membranous.—Species about 70, in the tropics of the old world.

Large much branched shrubs; cymes corymbose pedunculate, 2 to 4 in. in diam., often in panicles:—

Leaves pubescent to tomentose beneath, ovate-elliptic, elliptic or elliptic-rotund	... ..	1 <i>P. indica</i> .
Leaves slightly pubescent to glabrous beneath, elliptic lanceolate or oblanceolate	... ..	1 <i>P. indica</i> var. <i>glabra</i> .

Small little branched or unbranched shrubs; cymes sessile or nearly so, 1 to 2 in. in diam., never in panicles: leaves pubescent beneath:—

Calyx woolly; leaves densely and softly pubescent beneath	2 <i>P. naucleiflora</i> .
Calyx glabrous or nearly so; leaves hispidulous beneath...	3 <i>P. humilis</i> .

1. *PAVETTA INDICA*, Linn. sp. Pl. 110. A shrub or small tree, young branches slender, glabrous, pubescent, or tomentose like the leaves. Leaves membranous, variable in form, in the Malayan specimens (var. *polyantha*) elliptic-lanceolate or oblanceolate, in the British Indian ovate-elliptic, elliptic, or elliptic-rotund; in all, except some of the latter, acute or acuminate at the apex, pubescent tomentose or glabrous beneath, the base always much narrowed; main-nerves 5 to 7 pairs, usually faint, curved; length (in Malayan specimens) 4 to 7 in.; breadth 1 to 2 in.; petiole .35 to .5 in.; stipules triangular, acuminate, shorter than the petioles, deciduous. Cymes terminal, shorter than the leaves, on peduncles 1.5 to 4 in. in length, corymbose, many-flowered, 2 to 4 in. in diam., often in panicles; the stipules at the bifurcations rather large and persistent. Flowers on pedicels about .2 in. long. Calyx from .05 to .1 in. long, narrowly campanulate, with 4 short triangular teeth or sub-truncate. Corolla .5 to .75 in. long; the tube very slender, cylindrical; the limb .3 to .4 in. across, with 4 oblong blunt lobes. Style much exserted, slender like the stigma. Fruit globular-oblong, glabrous, about the size of a pea. Wall. Cat. 6175; Blume Bijdr. 951; W. & A. Prod. 431; Wight Ic. t. 148; Miq. Fl. Ind. Bat. II. 276; Hook. fil. Fl. Br. Ind. III. 150; Trim. Fl. Ceyl. II. 349. *P. Finlaysoniana*, Wall. Cat. 6177. *P. alba*, Vahl. Symb. III. 11. *P. petiolaris*, Wall. Cat. 6786; Hook. fil. Fl. Br. Ind. III. 150. *Ixora paniculata*, Lam. Dict. III. 344. *I. Pavetta*, Roxb. Fl. Ind. I. 385; Kurz Fl. Burm. II. 18.

In all the provinces, but not common.

VAR. *polyantha*, Hook. fil. l.c. 150. Flowers numerous, crowded in puberulous or pubescent cymes; leaves thinly membranous, oblanceolate or elliptic-lanceolate, glabrous or puberulous beneath. *P. polyantha*, Wall. Cat. 6176; Bot. Regist. t. 198. *P. graciliflora* Wall. Cat. 6178. *P. petiolaris*, Wall. Cat. 6180. *P. Rothiana*, DC. Prod. IV. 491:

W. & A. Prod. 431. *P. villosa*, Heyne in Roth. Nov. Sp. 88 (not of Napl.)
Ixora tomentosa var. *glabrescens*, Kurz. Fl. Burm. II. 19.

In all the provinces: common.

The variety *tomentosa*, Hook. fil. l.c. characterised by ovate or rotund elliptic often subacute thickly membranous leaves more or less pubescent or tomentose, and with the inflorescence also pubescent or tomentose occurs chiefly in British India. The synonymy of it is as follows: *P. tomentosa*, Wall. Cat. 6173 all the sheets except E.: *P. velutina* 6174: *P. mollis* 6179; *P. canescens* 6181.

2. *PAYETTA NAUCLEIFLORA*, Wall. Cat. 6171. A shrub or small tree, young branches thicker than a crow-quill, tawny-tomentose. *Leaves* oblanceolate, shortly acuminate, narrowed from above the middle to the petiole; both surfaces olivaceous when dry; the upper at first pubescent, afterwards becoming less so, but even when adult the midrib always pubescent; the lower densely and persistently pale-pubescent, especially on the midrib and 9 or 10 pairs of oblique prominent main-nerves; length 4·5 to 7 in.; breadth 1·35 to 2·75 in.; petiole ·3 to ·75 in., pubescent. *Stipules* broadly triangular, acuminate. *Cymes* terminal, solitary, densely compound-umbellate, 1·75 in. broad and not quite so long, the branches and pedicels densely pubescent; branches divaricate with a few ovate-lanceolate bracteoles near the flowers. *Flowers* ·75 in. long, excluding the style, on unequal pedicels always longer than the calyx. *Calyx* tubular ·1 in. long, ribbed, densely pubescent, the mouth with 5 short triangular erect teeth. *Corolla-tube* narrowly cylindric, sub-glabrous; limb pubescent and with 4 oblong blunt lobes. *Fruit* globular not ridged, sparsely hairy, crowned by the small calyx, ·25 in. in diam. two-celled by abortion. *Seed* single fleshy, convex on the back; G. Don, Gen. Syst. III. 575: Hook. fil. Fl. Br. Ind. III. 152. *Ixora naucleiflora*, Kurz, For. Flora. II. 19.

PENANG: *Curtis* 1060, 2217, 2646, 3382. PERAK: *Scortechini*; *Wray* 3619.—DISTRIB. Base of Eastern Himalaya, Burma.

3. *PAYETTA HUMILIS*, Hook. fil. Fl. Br. Ind. III. 151. A small shrub with unbranched pale rough stem 6 to 12 in. long, densely pubescent at first but afterwards sub-glabrous. *Leaves* membranous, close together, oblong-oblanceolate, shortly acuminate, much narrowed at the base; upper surface minutely rugulose when dry, glabrous, the midrib sparsely adpressed-hispid; lower surface sub-adpressed hispidulous: main-nerves 6 or 7 pairs, faint, little curved, ascending; length 3·5 to 6 in.; breadth 1·25 to 1·75 in.; petiole ·3 to ·5 in., swollen at the base, hispid; *stipules* broadly triangular, acuminate, hispid. *Cymes* solitary, terminal, sessile or sub-sessile, usually 1 to 1·5 in. in diam., dense. *Flowers* shortly pedicellate, glabrous, ·75 in. long. *Calyx* funnel-shaped, the mouth with 4 short acute teeth. *Corolla-tube* about ·6 in. long,

narrowly cylindric, the limb with 4 blunt oblong lobes. *Fruit* globular, glabrous, .25 in. in diam.

MALACCA: *Griffith* (K.D.) 3007; *Maingay* (K.D.) 855; *Hullett*, 763.

41. MORINDA, Linn.

Shrubby, sometimes scandent; rarely arboreous. *Leaves* membranous, rarely in whorls of three: stipules connate, sheathing. *Flowers* connate by their calyces, axillary or terminal, simple paniced or umbellate pedunculate heads. *Calyx-tube* short, the limb short or absent. *Corolla* salver- or funnel-shaped, coriaceous, the tube short; the limb usually 5- (rarely 4- to 7-) lobed, valvate in bud. *Stamens* equal in number to the corolla-lobes, on short filaments; anthers linear or oblong, dorsifixed. *Ovary* 2- or spuriously 4-celled; style included or exerted, 2-branched: ovules solitary in the ovarian cells, ascending. *Fruit* formed of the succulent enlarged calyces; the contained pyrenes 1-seeded, horny or cartilaginous, usually free but 2 or 4 of them sometimes cohering together. *Seeds* obovoid or reniform, with membranous testa and fleshy or horny albumen; the embryo terete, radicle inferior.—*DISTRIB.* Species about 40, all tropical.

Erect shrubs or trees, with pulpy infrutescences	...	1. <i>M. citrifolia</i> .
Large woody climbers:—		
Infrutescence dry, more than 1 to 2 in. in diam., externally marked with many large deeply pitted hardened calyces	... ..	2. <i>M. lucuosa</i> .
Infrutescence about 1 in. in diam., pulpy, smooth, bearing externally a few long narrow soft tubular calyces	... ..	3. <i>M. rigida</i> .
Infrutescence about .25 in. in diam., without large protruding calyces	... ..	4. <i>M. umbellata</i> .

1. *MORINDA CITRIFOLIA*, Linn. Sp. Pl. 176. A glabrous small tree or large shrub; young branches thinner than a goose-quill, obtusely 4-angled, pale-brown. *Leaves* broadly elliptic, occasionally obovate-elliptic, shortly acuminate, the base cuneate, one of the pair opposite the peduncle often suppressed; both surfaces pale-brown when dry: main-nerves 6 or 7 pairs, curved upwards, thin but slightly prominent on both surfaces; length 5 to 10 in.; breadth 2.25 to 4.5 in.; petioles .2 to .4 in.; stipules transversely oblong or sub-orbicular, entire or 2- to 3-fid., .3 to .5 in. long. *Peduncles* axillary, solitary, about .5 in. long, each bearing a many-flowered capitulum 1 to 1.75 in. in diam. *Calyx* truncate. *Corolla* fusiform in bud: the tube .3 to .5 in. long, pubescent in the throat, otherwise glabrous: limb .5 or .6 in. across, with 5 lanceolate lobes. *Anthers* with their tips exserted, filaments woolly. *Infrutescence* when

ripe ovoid or globose, 1 to 1.75 in. long, yellow, fleshy: each pyrene 2-seeded. Roxb. Fl. Ind. I. 541; Hunter in As. Resear. IV. 35; DC. Prod. IV. 446; Ham. in Trans. Linn. Soc. XIII. 533; W. & A. Prod. 419; Wall. Cat. 8418; Brand. For. Flora, 277; Kurz, For. Fl. Burm. II. 60; Hook. fil. Fl. Br. Ind. III. 155; Trimen Fl. Ceyl. III. 354; Gaertn. Fruct. I. 29. *M. bracteata*, Roxb. Hort. Beng. 15; Fl. Br. Ind. I. 544; Ham. l.c. 534; DC. l.c. 447; W. & A. l.c.; Wight Ill. t. 126; Wall. Cat. 8419; Brandis l.c. 277.

In all the provinces: in or near cultivation, but probably in many cases not wild.—DISTRIB. Brit. India, Ceylon, Malay Archipelago.

VAR. *elliptica*, Hook. fil. l.c. Leaves narrowly elliptic-oblong, tapering to each end, shining: peduncles slender, 1 to 1.5 in. long: fruiting heads .5 to .75 in. diam. Wall. Cat. 8434.

In all the provinces: more frequent than the typical form.

2. *MORINDA LACUNOSA*, King & Gamble, n. sp. A powerful climber 30 to 60 feet long: young branches thinner than a goose-quill, angled, sparsely and minutely pubescent. Leaves thickly membranous, elliptic, sharply and shortly acuminate, the base cuneate; upper surfaces dark-brown when dry, glabrous except the puberulous midrib; lower paler, the reticulations very distinct; main-nerves about 8 pairs, curving upwards, very bold on the lower surface, slightly depressed and faint on the upper; length 4.5 to 6 in.; breadth 2 to 2.75 in.; petioles .5 to 1.25 in.; stipules apiculate, only 15 in. long. Heads about .5 in. in diam. (when in flower) with one or two linear coriaceous bracts at their bases, solitary, on puberulous peduncles about 1 in. long, collected in twos or threes at the apices of the branches. Calyces completely confluent by their sides, irregularly cupular, the limb coriaceous, produced into a large oblique triangular lobe at one side, otherwise sub-truncate. Disk large, cushion-like, convex. Corolla unknown. Infrutescence (when ripe) globular, 1.5 in. in diam.; the surface covered with the protruding irregularly 4-sided conical enlarged calyces, each with a wide pit on its apex; individual fruits 2-celled, 2-seeded.

PERAK: King's Collector, 4320, 6030, 8254; Scortechini.

This is easily distinguished by its large deeply pitted infrutescence which is dry, not at all pulpy.

3. *MORINDA RIGIDA*, Miq. Fl. Ind. Bat. II. 246. A woody climber 20 to 30 feet long; young branches thinner than a goose-quill, at first minutely rusty-tomentose, afterwards with glabrescent pale spongy bark. Leaves dark-coloured when dry, the edges recurved, thickly coriaceous, narrowly elliptic, shortly and bluntly acuminate or blunt, the base cuneate; upper surface shining, glabrous except the pubescent

base of the midrib; the lower uniformly pale-pubescent; midrib distinct; main-nerves (18 to 12 pairs) very indistinct on both surfaces; length 2 to 4 in.; breadth 1 to 1.6 in.; petiole .3 or .4 in., pubescent. *Stipules* broadly oblong, blunt, scaly, .2 in. long. *Capitula* on puberulous peduncles .2 to .3 in. long, in fascicles of 3 or 4 at the apices of the branches. *Flowers* .4 in. long, confluent by their calyces into globular capitula .2 in. in diam. *Calyx* very short, cupular. *Corolla* salver-shaped, .35 in. long, the tube narrow, the limb with deflexed oblong blunt lobes .1 in. long, densely hairy on the upper surface. *Infrutescence* when ripe pulpy, elliptic (often transversely so) with one or two elongate very protruding enlarged calyx-tubes.

PERAK: *King's Collector* 4004; *Wray* 2284; *Ridley* 7204, 10258; *Hullett* 5665. SINGAPORE: *Ridley* 3818, 4126. MALACCA: *Griffith* (K.D.) 2947; *Mainyay* (K.D.) 874.—DISTRIB. Borneo.

4. *MORINDA UMBELLATA*, Linn. Sp. Pl. 176. A powerful glabrous climber; young branches thinner than a goose-quill, pale-brown, angled, shining. *Leaves* thinly coriaceous, narrowly oblong or elliptic-lanceolate, the apex shortly acuminate, the base much narrowed; both surfaces pale olivaceous-brown when dry, transversely reticulate; main-nerves 5 or 6 pairs, curved, ascending, faint; length 3.5 to 5 in.; breadth 1 to 1.35; petioles .2 to .3 in.; stipules sheathing, entire, truncate, or slightly toothed, .15 in. long. *Heads* sub-globular, about .25 in. in diam., on slender peduncles varying from .35 to 1 in. in length (lengthening in fruit to nearly 2 in.) from 5 to 8 collected in an ebracteate umbel at the end of a branch. *Calyx* sessile, truncate. *Corolla* almost rotate, longer than the calyx, its tube about 1 in. long, slightly constricted at the mouth, throat densely villous; limb .2 in. across, its lobes oblong, obtuse, glabrous on the outer surface, densely woolly on the inner. Ripe infrutescences about .25 in. in diam. DC. Prod. IV. 449; W. & A. Prod. 420; Wall. Cat. 8431; Kurz For. Flora, Burma, II. 62; Hook fil. Fl. Br. Ind. III. 157. *M. scandens*, Roxb. Fl. Ind. I. 548; DC. Prod. IV. 449. *M. tetrandra*, Jack in Mal. Misc. I. 13; Wall. Cat. 8432; Roxb. Fl. Ind. ed. Carey & Wall. II. 203; DC. l.c. *M. Padavora*, Juss. Gen. 206. *Morinda*, Wall. Cat. 8429.

In all the provinces; common.—DISTRIB. Burma, Southern India and Ceylon, Malay Archipelago, China, Japan, Australia.

VAR. *Scortechinii*, King & Gamble. Young branches, under surfaces of the leaves, and peduncles rusty-pubescent; leaves elliptic-obovate, shortly and abruptly acuminate; pedicels 1.5 to 2 in. long.

PERAK: *Scortechinii* 2015. Collected only once.

VAR. *Ridleyi*, King & Gamble. Young branches and under surfaces

of the leaves softly pubescent; *leaves* oblanceolate or oblong-lanceolate, shortly acuminate: peduncles less than 1 in. long.

SINGAPORE: in Botanic Garden Jungle, *Ridley* 5668, 6470, 6471, 6916.

42. RENNELIA, Korthals.

Characters of *Morinda* but the heads few-flowered and in terminal panicles, the ovules peltate; the seeds thin, orbicular.—DISTRIB. 5 or 6 Malayan species.

NOTE.—In this we include the genus *Tribrachya*, Korthals, which, as described by its author, differs from *Rennellia* only in having the flowers in each head limited to three.

Inflorescence paniculate	...	...	...	1 <i>R. paniculata</i> .
„ spicate	...	...	...	2 <i>R. speciosa</i> .

1. *RENNELIA PANICULATA*, King & Gamble, n. sp. A small glabrous tree or shrub; young branches at first dark-brown, afterwards becoming pale, striate, thickened at the nodes. *Leaves* sub-coriaceous, elliptic, acute or shortly acuminate, the base much narrowed; upper surface dark-brown when dry; the lower paler-brown, finely reticulate; main-nerves 10 to 12 pairs, slightly curved, spreading, prominent like the midrib on the lower surface, indistinct on the upper; length 6 to 9 in.; breadth 2·25 to 3·75 in.; petioles ·8 to 1·25 in.; stipules oblong, obtuse, 4 in. long. *Inflorescence* paniculate, erect, terminal; the branches opposite, or sometimes whorled, 6 to 9 in. long, each bearing at its apex 3 or more sessile flowers. *Calyx* a very shallow entire cup. *Corolla* coriaceous; the tube cylindric, 5 in. long; the limb nearly as long as the tube with 5 recurved lobes. *Anthers* included, attached near the throat, versatile, on short filaments. *Style* short; stigmas lanceolate. *Infrutescence* globular, 5 in. in diam., glabrous, with several orbicular calyces protruding on the surface.

PERAK: *Scortechini* 316; *King's Collector* 2164, 2592, 5432. PENANG: *Curtis*.

2. *RENNELIA SPECIOSA*, Hook. fil. Fl. Br. Ind. III. 158. A small glabrous shrub; young branches about as thick as a goose-quill, pale, striate, thickened at the nodes. *Leaves* thinly coriaceous, oblanceolate or elliptic-lanceolate, shortly acuminate, the base much narrowed; upper surface olivaceous-brown, the lower olivaceous, reticulate; main-nerves 7 to 9 pairs, curved, ascending, slightly prominent; length 5 to 9 in.; breadth 1·5 to 3·5 in.; petioles ·5 to 1 in.; stipules coriaceous, often 2-lobed, oblong, sub-acute, breaking off about the middle. *Inflorescence* 1 to 2 in. long, terminal, erect, on a short petiole; flowers from 3 to 6 on very short branches. *Calyx* sessile, cupular, truncate. *Corolla* coriaceous, 75 in. long, salver-shaped; limb with 5 short oblong

blunt sub-erect lobes. *Infrutescence* the size of a large pea. *Morinda speciosa*, Wall. Cat. 8436; Kurz For. Fl. Burma, II. 62.

MALACCA: Griffith (K.D.) 3046; Maingay (K.D.) 918/2. PERAK: *Scortechini* 668; Ridley 7197; Wray 2897, 4008; King's Collector 495, 5967.—DISTRIB. Burma.

VAR. *elongata* King & Gamble: *inflorescence* 2 to 6 in. long; flowers mostly in threes.

WELLESLEY PROVINCE: Ridley 7010. PAHANG: Ridley 2193, 5834. PERAK: King's Collector 3926; Ridley 9710; *Scortechini* 106.—DISTRIB. Sumatra.

43. PRISMATOMERIS, Thwaites.

Shrubs with compressed 4-angled branches. *Leaves* sub-coriaceous; stipules 1- or 2-cuspidate. *Flowers* unisexual, usually on slender pedicels, in sub-umbellate axillary and terminal, sometimes pedunculate fascicles. *Calyx-tube* in the male flowers small, turbinate; in the female longer, obovoid, persistent; limb cupular. *Corolla-tube* cylindric, with glabrous throat; lobes of the limb 4 or 5, spreading, valvate in bud. *Stamens* included in the corolla-tube and equal in number with the lobes of the limb; dorsifixed near their bases by short filaments. *Ovary* 2-celled; style filiform, with 2 linear or lanceolate arms; ovules solitary in each cell, attached above the middle of the septum. *Berry* small, 1-celled, 1-2-seeded. *Seed* sub-globose, peltate, deeply concave in the ventral surface; testa membranous; embryo small; cotyledons reniform; radicle inferior.—DISTRIB. 3 or 4 species, in tropical India, Ceylon and Malaya.

Flowers on rather long slender pedicels ... 1 *P. albidiflora*.

Flowers sub-sessile or sessile ... 2 *P. subsessilis*.

1. PRISMATOMERIS ALBIDIFLORA, Thw. in Hook. Kew Journ. VIII. 268, t. VII. f. A. An evergreen shrub or small tree, glabrous; young branches thicker than a crow-quill, pale. *Leaves* narrowly elliptic or elliptic-lanceolate, sometimes oblanceolate, the apex much acuminate, the base much narrowed; both surfaces pale-greenish or yellowish-brown, and rather dull when dry; the lower reticulate; main-nerves 5 to 7 pairs, curved, spreading and interarching about a line from the edge; length 2·5 to 4·5 in.; breadth ·75 to 1·5 in.; petioles ·1 to ·2 in.; stipules small, fugacious. *Flowers* usually in sessile fascicles, rarely in pedunculate umbels; pedicels ·3 to ·75 in. long, ebracteolate, filiform. *Calyx* ·05 to ·1 in. long. *Corolla* white; the tube ·5 to ·75 in. long, narrowly funnel-shaped, the lobes of the limb narrowly oblong, blunt, nearly as long as the tube, spreading. *Fruit* globose or ovoid, smooth, ·25 in. in diam. Thwaites Enum. Pl. Ceyl. 154, 421; Bedd. Ic. Pl. Ind. Or. t. 93; Hook. fil. Fl. Br. Ind. III. 159; Trimen Fl. Ceylon, II. 355.

Coffea tetrandra, Roxb. Fl. Ind. I. 538; Wall. Cat. 6242; DC. Prod. IV. 499; Kurz For. Fl. Burma. II. 28. *Rubiae*, Wall. Cat. 8470.

In all the Provinces: common.—DISTRIB. Burma, Khasia Hills, Malay Archipelago, Ceylon.

Besides the foregoing there is in Herb. Calcutta a single specimen (Ridley 2196) with flowers only in bud and no fruit. This is distinguished by ovate-elliptic leaves with 4 or 5 pairs of slightly curved ascending nerves, and few-flowered lax panicles on filiform axillary peduncles about 1.5 in. long.

2. *PRISMATOMERIS SUBSESSILIS*, King & Gamble. A glabrous shrub: young branches thinner than a goose-quill, pale, polished. *Leaves* narrowly elliptic, the apex and base acuminate; both sides pale-brown when dry, dull, the midrib prominent, the reticulations obsolete; main-nerves 5 to 7 pairs, slender, spreading, interarching .1 in. from the edge; length 2.25 to 4.5 in.; breadth .75 to 1.35 in.; petiole .15 to .4 in.; stipules under .1 in. in length, broad, connate into a ring, each 2-toothed. *Flowers* 2 or 3, on very short pedicels, or sessile, in a terminal fascicle. *Calyx* about .2 in. long, funnel-shaped, the limb wide, about as long as the tube, truncate with minute acute teeth. *Corolla* 1.25 in. long, salver-shaped, the tube narrow; the limb nearly as long as the tube, divided to its base into 5 narrowly lanceolate, deflexed, coriaceous lobes. *Fruit* a broad smooth didymous berry, about .6 in. in diam. and .5 in. long.

PERAK: *Scortechini* 355; *Wray* 289; *King's Collector* 8071: at elevations of 3000 to 4500 feet.

Differs from *P. albidiflora* in its nearly sessile flowers and larger calyx, corolla and fruit.

44. *GYNOCETHODES*, Blume.

Climbing glabrous shrubs with slender terete branches. *Leaves* opposite, coriaceous or sub-coriaceous; the stipules broad, acute, deciduous. *Flowers* small, on short pedicels, unisexual, in axillary fascicles or pedunculate heads; bracts deciduous. *Calyx* with a small short tube, the limb annular, truncate or 5-toothed, persistent. *Corolla* coriaceous with a short tube and woolly throat; the limb with 4 or 5 oblong-lanceolate lobes, valvate in bud, the apices inflexed. *Disk* broad, depressed. *Stamens* equal in number to the corolla lobes, on short filaments, dorsi-fixed, in the corolla tube, linear-oblong, exserted. *Ovary* 4-celled; style of male flower entire; of female stout, bifid. *Ovules* 1 in each cell, broad-based, attached to the inner angle of the cell. *Drupe* globose, fleshy, with 2 to 4 dorsally compressed pyrenes. *Seeds* compressed, ascending; testa membranous; embryo small, basal, radicle inferior.—DISTRIB. 3 or 4 species, all Malayan.

- Leaves broad and rounded at the apex, sometimes with a short broad blunt point, 2.25 to 4 in. long and 1.25 to 2.25 in. broad; fruit .5 in. in diam. ... 1. *G. coriacea*.
- Leaves acuminate at the apex, elliptic-lanceolate (often narrowly so) 2.25 to 3.25 in. long and .5 to 1.1 in. broad; fruit the size of a pea ... 2. *G. sublanceolata*.
- Leaves shortly and abruptly acuminate, rarely sub-acute, 3.5 to 5 in. long and 1.35 to 2.5 in. broad; fruit globose, .5 to .6 in. in diam. ... 3. *G. macrophylla*.

1. *GYNOCETHODES CORIACEA*, Blume Bijdr. 993. Young branches thinner than a goose-quill, nearly black. *Leaves* thinly coriaceous, elliptic, elliptic-rotund or elliptic-obovate, obtuse or shortly bluntly and abruptly apiculate, much narrowed to the base; main-nerves 4 to 6 pairs, spreading, only slightly curved, faint; both surfaces alike, nearly black, slightly shining; length 2.25 to 4 in.; breadth 1.2 to 2.25 in.; petioles .4 or .5 in.; *Flowers* .3 in. long, few, on short axillary peduncles. *Corolla-tube* very narrow, about as long as the limb; lobes of limb linear-oblong, densely hirsute on the upper surface, spreading. *Fruit* globose, pulpy, 4-celled; pyrenes 1-seeded. Miq. Fl. Ind. Bat. II. 313; DC. Prod. IV. 467.

SINGAPORE: (Bot. Garden Jungle), Ridley 6410, 10393, 2871.—
DISTRIB. Java, Borneo, Timor.

2. *GYNOCETHODES SUBLANCEOLATA*, Miq. Fl. Ind. Bat. Suppl. 548. Branches thinner than a goose-quill, dark-coloured when dry. *Leaves* thinly coriaceous, elliptic-lanceolate, often narrowly so, acuminate, the base much narrowed; both surfaces dull and blackish when dry; main-nerves indistinct, 5 or 6 pairs, ascending, little curved; length 2.25 to 3.25 in.; breadth .5 to 1.1 in.; petioles .2 to .4 in.; stipules triangular. *Flowers* few, about .35 in. long, sub-sessile on very short axillary branches. *Calyx-limb* truncate but with 5 distant minute teeth. *Corolla-tube* short, rather wide, hairy inside; limb with 5 broadly lanceolate sub-acute lobes longer than the tube. *Anthers* slightly exserted. *Stigma* with 2 elongate plano-convex lobes. *Fruit* pisiform, smooth, on a short pedicel. Hook. fil. Fl. Br. Ind. III, 160. *G. coriacea*, var.—, Miq. in. Ann. Mus. Lugd. Bat. IV. 244. *Paederia tetrandra*, Wall. Cat. 6249. ? *Psychotria*, Wall. Cat. 8885. *Rubiacea*? Wall. Cat. 8297.

SINGAPORE: *G. Thomson*; Ridley; King's Collector 319. MALACCA: Maingay (K.D.) 919; Griffith. PENANG: Wallich.—DISTRIB. Borneo, Sumatra.

3. *GYNOCETHODES MACROPHYLLA*, Kurz in Journ. As. Soc. Beng. 1872, Pt. II, 314. Young branches angled, nearly as thick as a goose-quill, the bark pale. *Leaves* coriaceous, elliptic or elliptic-oblong, shortly

and abruptly acuminate or sub-acute, the base cuneate; upper surface very dark-brown and shining when dry, the lower paler and dull; main-nerves 6 or 7 pairs, spreading, slightly prominent on the lower surface scarcely visible on the upper; length 3·5 to 5·5 in.; breadth 1·35 to 2·5 in.; petioles ·3 to ·5 in.; stipules short, broad. *Flowers* ·25 in. long, on thick short axillary pedicels. *Calyx*-tube almost globular; the limb cupular, as long as the tube, truncate. *Fruit* ·5 or ·6 in. in diam., pulpy, globose or broadly depressed-pyriform with 4 pyrenes (one often abortive). Kurz For. Flora Burm. II. 33: Hook, fl. Fl. Br. Ind. III. 160.

MALACCA: *Maingay* (K.D.) 934.

PERAK: *Ridley*; *Wray* 1156; *King's Collector* 5807.—DISTRIB. Andamans, Nicobars.

The Andaman specimens have darker narrower leaves than those from the Malay Peninsula.

45. SPERMACOCE, Linn.

Herbs or small under-shrubs, usually with 4-angled branches. *Leaves* membranous or coriaceous, penni-nerved or longitudinally nerved; the stipules connate into a campanulate tube with a truncate bristly mouth. *Flowers* usually red or blueish, small or minute, solitary and axillary, or in axillary or terminal fascicles, heads or cymes, sometimes densely crowded. *Calyx* obovoid, or ovoid, the mouth with 2 or 4 persistent teeth often with interposed bristles or processes. *Corolla* funnel- or salver-shaped; the mouth with 4 valvate lobes. *Stamens* 4, inserted on the throat or tube of the corolla, filaments short or long. *Anthers* linear or oblong, included or excluded. *Disc* tumid or absent. *Ovary* 2-celled; each cell with a single ovule attached to the middle of the septum, amphitropous. *Style* filiform; stigma capitate or with 2 oblong arms. *Fruit* coriaceous or crustaceous, mericarps dehiscent variously. *Seeds* oblong or ovoid, grooved ventrally, the testa thin, embryo axile, cotyledons thin and broad.—DISTRIB. Species about 150, tropical and sub-tropical.

- | | |
|---|---------------------------|
| Leaves spatulate, obovate or bluntly oblong, the base narrowed, main-nerves 3 pairs, faint, hispid ... | 1. <i>S. hispida</i> . |
| Leaves narrowly elliptic, tapering acutely to each end, main-nerves 3 or 4 pairs, very bold and prominent beneath | 2. <i>S. scaberrima</i> . |
| Leaves narrowly oblong-lanceolate, acute, pale beneath, main-nerves sub-obsolete ... | 3. <i>S. stricta</i> . |

1. SPERMACOCE HISPIDA, Linn. Sp. Pl. 102. Herbaceous, diffuse, spreading or sub-erect; stems half as thick as a goose-quill, acutely 4-angled and somewhat grooved when dry, sparsely and minutely

hispid, especially on the angles. *Leaves* sub-coriaceous, obovate, spatulate or oblong, sometimes elliptic, always blunt at the apex and tapering more or less to the base, continuous with the short, wide-cupular, pubescent bristle-bearing persistent stipules; upper surface reticulate (when dry), scaberulous, olivaceous, strigose; the lower pale, with spreading hispid hairs on the nerves; main-nerves about 3 pairs, rather straight, faint, oblique; length .35 to .75 in.; breadth .15 to .4 in. *Cymes* small, axillary, hardly longer than the stipules, 4- to 6-flowered. *Flowers* .4 in. long, sessile, with a few small membranous toothed bracteoles between them. *Calyx* small, densely silky, urceolate-campanulate, with 4 long narrow acute spreading lobes. *Corolla* three times as long as the calyx, salver-shaped, glabrous, the 4 broadly ovate teeth silky at their apices. *Stamens* about as long as the corolla-lobes; anthers oblong, filaments and style equal. *Stigma* large, transversely oblong. *Capsule* ovoid or sub-globular, sparsely hispid, crowned by the narrow, reflexed calyx-lobes, 2-celled with a single brown seed in each cell. DC. Prod. IV. 555; Roxb. Fl. Ind. I. 373; Wall. Cat. 825; W. & A. Prod. Fl. Penins. Ind. 438; Hook. fil. Fl. Br. Ind. III. 201; Trimen Fl. Ceyl. II. 371. *S. articularis*, Linn. fil. Suppl. 119; Roxb. Fl. Ind. l.c.; Wall. Cat. 827; W. & A. Prod. l.c.; Kurz Journ. As. Soc. Beng. 1877 II. 137. *S. scabra*, Willd. Sp. Pl. I. 572; Roxb. l.c. 371; Wall. Cat. 824. *S. hirta*, Rottb. in Nov. Ac. Berol. 1803, 95. *S. longicaulis*, Wall. Cat. 826. *S. avana*, Wall. Cat. 828. *S. ramossissima*, Wall. Cat. 829. *S. tubularis* Br. in Wall. Cat. 836.

In all the provinces: common.—DISTRIB. British India, Ceylon, S. China, Malaya Archipelago.

2. SPERMACOCE SCABERRIMA, Blume Bijdr. 946. Herbaceous, woody near the base; stems procumbent, much branched, thinner than a goose-quill, 4-angled, the angles with stiff reflexed small white hairs, otherwise glabrous and shining, dark-brown. *Leaves* olivaceous, coriaceous, narrowly elliptic, tapering acutely to each end, sessile, upper surface scaberulous, with a very few short white hairs; the lower paler, pilose on the midrib and nerves; main-nerves 3 or rarely 4 pairs, ascending obliquely, little curved, depressed on the upper surface and very prominent in the lower; length .5 to 1 in.; breadth .2 to .4 in. *Stipules* cupular, the mouth with 3 to 7 erect stiff bristles, glabrous. *Cymes* small, axillary, sessile, 4- to 8-flowered, condensed, .15 to .2 in. in diam. *Flowers* about .15 in. long, sessile or on very short pedicels, with short filiform bracteoles between them. *Calyx* oblong, constricted below the mouth, glabrous, the lobes lanceolate, slightly ciliate on the edges, spreading. *Corolla* not much exceeding the calyx, funnel-shaped, glabrous except for a few ciliae on the edges near the

base of the narrowly-lanceolate spreading lobes. *Stamens* exserted from the throat of the corolla but shorter than its lobes. *Anthers* oblong, the filaments rather long. *Style* about as long as the filaments; stigma large, thick, transversely oblong. *Capsule* slightly more than .1 in. long, oblong, crowned by the large spreading calyx-lobes, smooth, membranous, dehiscent, each cell containing a single oblong blunt black seed. DC. Prod. IV. 555; Miq. Fl. Ind. Bat. II. 331; Hook. fil. Fl. Br. Ind. III. 201. *S. longicaulis*, Br. in Wall. Cat. 826.

MALACCA: *Grißb.* SINGAPORE: *Ridley* 5897, 8954. PERAK: *Scortechini* 12, 64, 78, 602.—DISTRIB. Malay Archipelago.

3. SPERMACOCE STRICTA, Linn. fil. Suppl. 120. Herbaceous, erect, little-branched, pale-olivaceous when dry; branches as thick as a crow-quill, 4-angled and with 2 broad deep grooves, minutely hispid or sub-glabrous. *Leaves* sessile, coriaceous, oblong-lanceolate, acute, the base narrowed to the stipule; upper surface shining, glabrous or minutely hispid; the lower paler, dull, the midrib prominent and sometimes minutely hispid, nerves obsolete on both surfaces; length .75 to 1.25 in. *Stipules* conjoined to form a deep campanulate cup, the mouth acuminate or truncate but always with 6 to 8 long spreading bristles. *Flowers* .3 in. long, in clusters of 2 or 3, axillary, sessile subtended by a few pectinate bracteoles. *Calyx* campanulate, hispid outside, the mouth with 4 deep, lanceolate, acuminate, spreading lobes. *Corolla* much exserted beyond the calyx, tubular, with 4 deep, oblong, sub-erect lobes inflexed and sometimes hispid at the apex. *Stamens* slightly exserted; anthers sagittate, on long filaments. *Stigma* large, 2-lobed, as long as the stamens; style long filiform. *Capsule* oblong-obovoid, smooth, membranous, 2-celled, dehiscent, with a single black oblong seed in each cell. Roxb. Hort. Beng. 83; Fl. Ind. I. 370; DC. Prod. IV. 554; Kurz in Journ. As. Soc. Beng. 1877 II. 137. *S. lasiocarpa* Br. in Wall. Cat. 832. *S. pusilla*, Wall. in Roxb. Fl. Ind. ed. Carey & Wall. I. 379; Cat. 823; Don. Prod. 134. *S. filina*, *Gardneri* and *angustifolia*, Wall. Cat. 830, 834, 835. *S. triandra*, Ham. in Don. Prodr. 134. *Bigelovia stricta*, Blume Bijdr. 945. *B. lasiocarpa*. *Roxburghiana* & *Kleinii*, W. & A. Prod. 437. *B. myriantha*, Miq. Fl. Ind. Bat. II. 334. *Borreria pusilla*, DC., Prod. l.c. 543.

PENANG: *Curtis* 1936. MALACCA: *Goodenough* 1490. PAHANG: *Ridley* 1624.—DISTRIB. British India.

46. PAEDERIA, Linn.

Twining, slender, foetid shrubs, glabrous or pubescent; the branches thin. *Leaves* opposite, rarely in whorls of three, membranous

petiolate, stipules broad, acuminate, deciduous. *Flowers* in axillary and terminal 2-3-chotomously branched cymose panicles, with or without bracteoles. *Calyx* tube campanulate or turbinate; the limb 4 or 5 toothed, persistent. *Corolla* funnel-shaped, its throat glabrous or villous; 4 or 5 lobes of the limb with inflexed crenulate margins, their apices sometimes 3-lobed, spreading. *Stamens* 4 or 5, linear-oblong, inserted in the tube of the corolla by very short filaments. *Ovary* 2-celled; stigmas 2, slender, twisted. *Ovules* one in each cell, basal, erect. *Fruit* compressed or globose, with thin shining fragile epicarp, separating early from the 2 pyrenes; pyrenes orbicular or ovoid, dorsally compressed, with or without wings, each containing a single compressed seed with membranous testa adherent to the pyrene; cotyledons large, thin, cordate; radicle small, inferior.—*DISTRIB.* Species 10 to 12 mostly in tropical Asia, one in Brazil.

Fruit compressed, orbicular; pyrenes flat, winged, with radiating ridges on the dorsal surface:—

- | | | | | |
|--|-----|-----|-----|-----------------------------|
| Leaves and the branches of the panicles always opposite ... | ... | ... | ... | 1. <i>P. foetida</i> . |
| Leaves and the branches of the panicles often in verticels of three ... | ... | ... | ... | 2. <i>P. verticellata</i> . |
| Fruit globular; pyrenes cupped, with neither marginal wings or dorsal ridges ... | ... | ... | ... | 3. <i>P. tomentosa</i> . |

1. *PAEDERIA FOETIDA*, Linn. Mant. I. 52. Glabrous or puberulous; branches thinner than a goose-quill, dark-coloured and compressed when dry. *Leaves* ovate to lanceolate, the apex acute or apiculate, the base usually rounded or slightly cordate but sometimes cuneate; both surfaces cinereous or olivaceous-brown when dry, and finely reticulate, glabrous except for the occasional pubescence on the leaf nerves beneath and the tufts in their axils; main-nerves 4 or 5 pairs, oblique, faint; length 2 to 3·5 in.; breadth 1 to 1·5 in.; petioles ·5 to 1·5 in.; stipules broadly ovate-lanceolate, acuminate, often bifid, under ·1 in. in length. *Flowers* pink, ·35 in. long, shortly pedicellate, in lax spreading trichotomous (often scorpioid) cymes arranged in divergent axillary and terminal panicles from 3 to 15 in. long and usually bearing leaves like those of the stem but smaller; bracteoles minute, linear. *Calyx* less than ·1 in. long, campanulate, its mouth acutely 4- to 5-toothed. *Corolla* funnel-shaped, three times as long as the calyx, usually pubescent; the lobes of the limb crenulate, short, spreading only slightly. *Fruit* ·4 to ·5 in. across, orbicular; epicarp with 5 curved vertical veins in each side, thin, shining; pyrenes orbicular, with pale marginal wings, the centre with many bold radiating ridges on the dorsal surface, nearly smooth on the ventral. Wall. Cat. 6247, excl. E.; Roxb. Fl. Ind. I. 683; id. ed.

Wall. & Carey II. 517; W. & A. Prod. Fl. Pen. Ind. 424; Blume Bijdr. 968; DC. Prod. IV. 471; Griff. Notul. IV. 267; Ic. Pl. Asiat., t. 479, f. 3; Miq. Fl. Ind. Bat. II. 258; Miq. in Ann. Mus. Lugd. Bat. IV. 254; Hook. fil. Fl. Br. Ind. III. 195.

PERAK: *King's Collector* 1125, 4916, 7560; *Scortechini* 263. PAHANG: *Ridley* 1256. PENANG: *Curtis* 24. MALACCA: *Griffith*.—DISTRIB. British India, Malay Archipelago, Andaman Islands.

2. *PAEDERIA VERTICILLATA*, Blume Bijdr. 968. Glabrous except the lower surfaces of the leaves; branches thinner than a goose-quill, dark and slightly and bluntly 4-angled when dry. *Leaves* coriaceous, usually opposite but sometimes in whorls of three, lanceolate, ovate-lanceolate or elliptic, shortly acuminate, the base cuneate; both surfaces brown when dry, dull, the upper always glabrous, the lower often pubescent, the reticulations on the lower side rather distinct and transverse; main-nerves 6 or 7 pairs, curving, oblique, rather prominent on the lower surface; length 2.5 to 4 in.; breadth 1 to 1.75 in.; petioles 1 to 1.75 in.; stipules broadly triangular, short, very deciduous. *Flowers* .6 in long, funnel-shaped, shortly pedicellate in lax pedunculate branching cymes arranged in pairs or whorls of three in long narrow panicles, bracteoles minute. *Panicles* from 3 to 18 in. long, often bearing petiole narrowly oblong leaf-like bracts .5 in. long; branches from .75 to 3 in. long, diverging, opposite or in whorls of three. *Calyx* less than .1 in. long, glabrous or puberulous, narrowly funnel-shaped, the mouth dilated and with 4 small triangular teeth or sub-truncate. *Corolla* tubular, constricted at the base, .6 in. long; the teeth less than .1 in. long, acute, erect. *Antthers* linear-oblong, apiculate, included in the corolla; their filaments nearly as long as themselves, dorsi-fixed. *Fruit* much compressed, orbicular, .4 to .5 in. across, with 5 curved vertical veins on each side; pyrenes as in *P. foetida*. DC. Prod. IV. 471; Miq. Fl. Ind. Bat. II. 259; Hook. fil. Fl. Br. Ind. III. 195; Ann. Mus. Lugd. Bat. IV. 255.

SELANGOR: *Ridley* 7416. MALACCA: *Maingay* (K.D.) 885. PERAK: *Scortechini* 446, 1573; *Wray* 3042; *King's Collector* 3177, 3736, 4457, 4780, 5316, 5410, 10613; *Curtis* 3182, 3340. SINGAPORE: *Ridley* 2835, 3647, 6469.—DISTRIB. Borneo.

3. *PAEDERIA TOMENTOSA*, Blume Bijdr. *var. GLABRA*, Kurz. Glabrous or sparsely pubescent; branches slightly thicker than a crow-quill, compressed and brown when dry. *Leaves* membranous, ovate to lanceolate; apex acute, base rounded or cuneate: both surfaces brown when dry, the lower paler and minutely reticulate, pubescent in the nerve axils; length 2.25 to 4 in.; breadth .85 to 1.5 in.; petioles .25 to 1 in.; stipules not connate, triangular, acuminate, less than .1 in. long. *Panicles* as

in *P. foetida* but shorter and less branched; the branches long (often 2·5 in.), diverging, markedly scorpid. Flowers ½ in. long, secund, sessile or pedicellate on the same branch. Calyx ½ in. long, narrowly campanulate, with 5 sharp teeth, glabrous. Corolla ½ in. long, cylindric, the mouth with 5 short erect acute teeth, pubescent outside. Fruit 2 to 3 in. in diam., globular, shining, without veins, crowned by the small calyx; pericarp brittle, pale-brown when dry. Pyrenes cupular, without wings or ridges. DC. Prod. IV. 471; Miq. Fl. Ind. Bat. II. 258; Miq. in Ann. Mus. Lugd. Bat. II. 254; Hook. fil. Fl. Br. Ind. III. 197. *P. barbulata* Miq. in Ann. Mus. Lugd. Bat. IV. 255.

MALACCA: *Maingay* (K.D.) 886. PERAK; *Scortechini* 1376; *King's Collector* 6048.—DISTRIB. Malayan Archipelago.

The typical form of this has pubescence on the stems, under surfaces of the leaves and on the panicles. It is the form found in Burma and Assam. In our region only this variety *glabra* has as yet been collected. Except in the shape of its fruit and seeds this species differs little from *P. foetida*, Liun.

47. SAPROSMA, Blume.

Shrubs, foetid when bruised, usually glabrous, often with subulate bristles at the apices of the branches and the bases of the peduncles. Leaves membranous, sometimes in whorls of 3 or 4; stipules usually connate into a 1- to 3-pointed sheath. Flowers small, white, axillary or terminal, solitary or in fascicles of about 3, sessile or pedicelled, or in pedunculate cymes; the bracteoles minute, often connate. Calyx-tube funnel-shaped; the limb dilated, 4- to 6-lobed or toothed; persistent. Corolla funnel-shaped or campanulate, the throat villous; the limb with 4 or 5 broad blunt lobes valvate in bud and with inflexed margins. Stamens 4, inserted on the throat, sessile or on short filaments; anthers more or less narrowly oblong. Ovary 2-celled; style filiform, with 2 short branches; ovules 1 in each cell, erect, basal. Fruit small, oblong or globose, containing 2 or (by abortion) 1 pyrene. Seeds elliptic and solitary, or two and plano-convex the plane surface not grooved; cotyledons small and leafy; radicle small, inferior.—DISTRIB. About 10 species, tropical Asiatic.

Flowers sessile in dense glomeruli 1. *S. glomerulatum*.
Flowers pedicelled, in cymes:—

Glabrous:—

Cymes about 1 in. long, laxly 3-flowered 2. *S. Scortechinii*.

Cymes from 1·5 to 3·5 in. long, more than 3-flowered,
the branches lax, spreading 3. *S. ternatum*.

More or less pubescent... .. 4. *S. Ridleyi*.

1. *SAPROSMA GLOMERULATUM*, King & Gamble, n. sp. A shrub, very foetid when bruised; young branches thicker than a crow-quill,

compressed, brown when dry. *Leaves* thinly coriaceous, elliptic or ovate-elliptic, shortly and sharply acuminate, the base more or less cuneate, both surfaces brown when dry; the lower paler, dull, and with sparse transverse reticulations; main-nerves 6 to 9 pairs, pale and prominent on the lower surface like the midrib, depressed on the upper; length 3.5 to 7 in.; breadth 1.75 to 3 in.; petioles .25 to .4 in.; stipules cartilaginous, united into a short more or less persistent ring with some short bristly processes inside it. *Flowers* crowded, to the number of 4 or 5, in a multibracteate solitary glomerulus borne at the apex of a short branch between two leaves; the branch bearing in its lower third a pair of lanceolate bracts about .5 in. long. *Female* glomerulus quite sessile, about .3 in. long and .4 in. broad; the male glomerulus somewhat larger than the female, borne on a short compressed peduncle .4 to .75 in. long and enveloped for the lower two-thirds of its length in a loose sheath formed of two acuminate partly conjoined bracts. The outer bracteoles of each glomerulus longer and thicker than the inner, broad, very concave, and forming a persistent involucre; the middle bracteoles broadly ovate-rotund with terminal caudate appendages; the inner ones narrower and embracing the flowers by pairs, appendiculate. *Flowers* sessile, about .25 in. long. *Calyx* .1 in. long, coriaceous, campanulate, the mouth truncate and with 4 or 5 minute distant acute teeth. *Corolla* salver-shaped, about .2 in. long; the tube short and wide; the limb longer than the tube, with 4 broad blunt spreading lobes; anthers 4 to 6, linear-oblong. *Fruit* sessile, sub-globular, smooth, crowned by the small annular calyx, .3 to .35 in. in diam.; pericarp thick; seed solitary, sub-globular, hard.

PERAK: *Scortechini*; *Ridley* 9835; *King's Collector* 783, 6031, 8166. SINGAPORE: *Ridley* 10931. JOHORE: *Ridley* 4213.

The fruit when ripe is said to be blue, and the flowers variously pale-green or white.

VAR. *angustifolia*, King & Gamble: leaves rather more coriaceous than in the typical form, ovate-lanceolate, acuminate, 3 to 4 in. long and 1.25 to 1.4 in. broad.

MALACCA: *Goodenough* 1856. NEGRI SEMBILAN: *Ridley* 1856.

Flowers are absent in both the specimens cited here. When these are obtained, they may afford characters to separate this as a good species.

2. *SAPROSMA SCORTECHINII*, King & Gamble, n. sp. A shrub, glabrous except the midrib and nerves of the leaves on the lower surface; young branches thicker than a crow-quill, with pale-brown spongy bark. *Leaves* thinly coriaceous, elliptic, shortly and bluntly acuminate, the base cuneate; both surfaces brown when dry; the upper glabrous; the

lower puberulous on the midrib, otherwise glabrous, laxly reticulate; midrib bold on both surfaces; main-nerves 6 or 7 pairs, oblique, bold on the lower surface, faint on the upper; length 3.5 to 5.5 in.; breadth 1.5 to 2.5 in.; petiole .2 to .25 in. *Stipules* very short, connate into a sheath; mouth with short bristles. *Cymes* one to three at the apices of the branches, about 1 in. long (longer in fruit), laxly 3-flowered, the peduncle angled, puberulous, with small lanceolate bracteoles in whorls. *Flowers* .5 in. long; their pedicels about the same. *Calyx* funnel-shaped; the mouth with 4 deep linear-lanceolate spreading lobes. *Corolla* twice as long as the calyx, tubular, expanding at the mouth; lobes 4, oblong, blunt; throat with a ring of hairs. *Stamens* 4, included. *Antthers* curved, oblong; their filaments attached to the tube. *Disk* conical. *Ovary* 2-celled, 2-ovuled. *Fruit* ellipsoid, smooth, .65 in. long; the remains of the calyx .2 in. long, blue when ripe. *Seed* solitary.

PERAK: *Scortechini* 511, 670; *Kings Collector* 4138, 5020.

3. *SAPROSMA TERNATUM*, Hook. fl. in Bth. & Hook. fl. Gen. Plant. II. 131; Fl. Br. Ind. III. 193. A glabrous shrub; young branches rather thinner than a goose-quill, pale when dry, compressed. *Leaves* often in whorls of three, thickly membranous, elliptic or elliptic-lanceolate, rarely oblanceolate-elliptic, shortly and rather abruptly acuminate, the base cuneate; both surfaces pale-brown when dry, the upper shining; the lower dull and paler; main-nerves 7 to 9 pairs, oblique, little curved, pale and prominent on the lower surface, the reticulations transverse and rather distinct on the lower surface only; length 4 to 8 in.; breadth 1.5 to 3.25 in.; petioles .4 to .6 in. long, with many short unequal bristles at their bases and inside the connate setosely-toothed stipules. *Cymes* solitary or fascicled, from 1.5 to 3.5 in. long, (longer in fruit) axillary, pedunculate, or branching from the base; the branches lax, spreading, sparsely flowered; the bracteoles few, linear. *Flowers* .4 in. long, on pedicels varying from .2 to .6 in. long. *Calyx* .1 in. long, shortly campanulate, the mouth wide and with 4 broad blunt teeth. *Corolla* .3 in. long, salver-shaped, puberulous; the tube wide; the limb .35 in. across with 4 or 5 broad reflexed lobes. *Fruit* ovoid or sub-globular, crowned by the rather large calyx-teeth, .35 in. in diam.; 1-seeded; seeds ellipsoid. Kurz. For. Fl. Burma II. 29. *Paederia ternata*, Wall. Cat. 6248 Roxb. Fl. Ind., ed. Carey & Wall., II. 520; DC. Prod. IV. 471. *Mephitidea* sp., Griff. Notul. IV. 267; Ic. Pl. Asiat. t. 476.

PERAK: *Scortechini* 1163; *Wray* 2262, 2907, 2929, 3943; *King's Collector* 1975, 2764, 3052, 4006, 4069, 6760, 8491. PAHANG: *Ridley* 2225. SELANGOR: *Ridley* 8236.—DISTRIB. Andaman Islands, Burma, Khasia Hills, Sumatra, Java.

4. *SAPROSMA RIDLEYI*, King & Gamble. A shrub? Young branches

compressed, thicker than a crow-quill, pale, glabrous below, pubescent or tomentose towards the apices. *Leaves* membranous, oblanceolate to elliptic, shortly and rather bluntly acuminate, the base much narrowed; both surfaces pale-brown when dry and minutely pitted; the upper glabrous and with the midrib channelled; the lower sparsely pubescent, the midrib densely so and prominent; main-nerves 7 to 10 pairs, spreading but curving upwards at their apices, thin but prominent below; length 3 to 3.75 in.; breadth 1 to 1.5 in.; petiole .1 to .15 in. *Stipules* connate, pale, coriaceous, forming a narrow cup pubescent outside at first, but ultimately glabrous, from less than .1 to .15 in. deep, irregularly toothed, persistent. *Cymes* axillary and terminal, less than half as long as the leaves, trichotomous, the branches 3- or more-flowered, often with 2 elliptic acute involucre bracts at the base. *Flowers* .25 in. long, their pedicels .1 in. *Calyx* salver-shaped, .15 in. long; the tube narrow, tomentose externally; the limb with 5 deep oblong blunt spreading or deflexed lobes; disk large. *Ovary* 2-celled, 2-seeded. *Corolla* and *Fruit* unknown.

SINGAPORE: Ridley 6474, only one specimen seen.

48. HYDNOPHYTUM, Jack.

Glabrous epiphytic shrubs, with a dilated tuberous fleshy stem, simple or lobed and perforated by ants. *Leaves* coriaceous, elliptic, obtuse. *Flowers* small, sessile, axillary, solitary or in fascicles, white. *Calyx-tube* ovoid-cylindric, the limb truncate. *Corolla* salver or funnel-shaped; tube short, hairy inside; limb 4-lobed, valvate. *Anthers* 4, oblong, subsessile on the corolla-throat. *Ovary* 2-celled; stigma 2-lobed; ovules one in each cell, basal, erect. *Fruit* containing two coriaceous pyrenes surrounded by pulp. *Seeds* oblong, plano-convex, testa thin with dark lines, embryo in the centre of the fleshy albumen.—
DISTRIB. 3 or 4 species in Malaya, N. Australia, Fiji.

HYDNOPHYTUM FORMICARIUM, Jack in Trans. Linn. Soc. XIV. 124. All parts glabrous. *Stem* tuber-like, smooth, several inches to a foot in diameter, bearing roots from its base and from its apex a few short branches as thick as a goose-quill and compressed near the nodes, pale and striate when dry. *Leaves* elliptic or elliptic-oblong, sometimes obovate, the apex obtuse, the base cuneate; both surfaces pale-brown when dry; the midrib distinct on both; the 6 or 7 pairs of ascending little-curved main-nerves slender on both surfaces and the reticulations obsolete; length 2.5 to 3.5 in.; breadth 1 to 2.5, petioles .1 to .2 in. *Flowers* few, .25 in. long, sessile in axillary fascicles. *Calyx* widely campanulate with rounded base and truncate apex. *Corolla-tube* nearly twice as long as the calyx, wide, with 4 tufts of hair in the throat; limb about

half as long as the tube, with 4 broad oblong acute lobes, thickened at the apex. *Anthers* elliptic, on very short filaments inserted at the base of the tube. *Fruit* broadly ovoid, crowned by the cup-like remains of the calyx, glossy orange-red when ripe, about .2 in. long. Blume Bijdr. 956: DC. Prod. IV. 451; Kurz For. Flora Burma, II. 8; Hook. fil. Fl. Br. Ind. III. 194; Beccari Malesia II. t. XLVII. f. 1 to 11; XLVIII. f. 1 to 8. *H. montanum*, Blume and DC. II. cc. *Lasiosoma formicarum*, Spreng. Syst. I. 423; Wall. Cat. 9055.

MALACCA: Griffith (K.D.) 2975; Maingay (K.D.) 864. PENANG: Curtis 2164. PERAK: Scortechini 934; Wray 2673; King's Collector 4994. JOHORE: Ridley 335, 2840. SINGAPORE: Ridley 1617.—DISTRIB. Cochin-China, Sumatra, Borneo.

49. GEOPHILA, Don.

Small, slender, usually perennial, creeping herbs, glabrous or pubescent, the stems rooting. *Leaves* orbicular, reniform, ovate, often cordate, on long petioles. *Stipules* ovate, entire. *Flowers* small, solitary and subsessile or in pedunculate, bracteate, axillary or terminal umbels. *Calyx-tube* obovoid; its segments from 5 to 7, slender, persistent, spreading or reflexed. *Corolla* rather long, funnel-shaped, the throat hairy; lobes 4 to 7, valvate in bud. *Stamens* equal in number to the lobes. *Anthers* dorsifixed, linear; filaments thin. *Ovary* 2-celled; style slender, with 2 long or short branches: ovules erect, one in each cell. *Fruit* fleshy, with two plano-convex pyrenes. *Seeds* plano-convex, without any ventral groove; embryo minute, basal; radicle inferior.—DISTRIB. about 16 species, all tropical.

Leaves with broad, usually cordate bases:—

Flowers solitary, axillary:—

- | | | | |
|--|-----|-----|-----------------------------|
| Leaves glabrous, .5 in. long | ... | ... | 1. <i>G. humifusa</i> . |
| Leaves hairy, .6 to 1 in. long | ... | ... | 2. <i>G. pilosa</i> . |
| Peduncles with 1 to 3 flowers; leaves reniform to ovate-cordate, glabrous, .5 to 1.75 in. in length and breadth | | | 3. <i>G. reniformis</i> . |
| Peduncles with 6 to 9 flowers in an umbel; leaves glabrous, 1.75 to 3 in. long | ... | ... | 4. <i>G. melanocarpa</i> . |
| Leaves with narrow bases never cordate, sparsely and minutely adpressed hairy, 1 to 1.5 in. long, peduncles few-flowered | ... | ... | 5. <i>G. Scortechinii</i> . |

1. *GEOPHILA HUMIFUSA*, King & Gamble, n. sp. Stems very slender, glabrous, rooting at the nodes, often several feet long. *Leaves* thickly membranous, glabrous, in distant pairs, ovate-cordate, acute, the edges undulate when dry, .4 in. long and .25 in. broad, the petiole as long as the blade, main-nerves about 3 pairs, one pair basal; stipules

broad-ovate, .1 in. long. *Flowers* solitary, axillary, sub-sessile. *Fruit* as large as a currant, fleshy, bright-red.

PERAK: *Scortechini* 412.—DISTRIB. JAVA: on the Gedeh Volcano, *King*. SUMATRA: *Beccari* 44; *Forbes* 2059.

2. *GEOPHILA PILOSA*, H. H. W. Pearson in Hook. Ic. Plant., t. 2691. More slender than *G. reniformis*, the stem, leaves, peduncles and calyx with much stiff pubescence. *Leaves* broadly ovate-cordate, with sub-acute apices and slightly waved edges, both surfaces and petioles with pale stout curved hairs, the upper olivaceous, the lower paler green; main-nerves 3 pairs, much curved, spreading and ascending, rather distinct (when dry) on the lower; length .6 to 1 in.; breadth .35 to .65 in.; petioles .5 to 2 in. *Stipules* ovate, .1 in. long. *Peduncles* terminal, .5 to .8 in. long, tomentose. *Flowers* solitary, or 2 to 3 in an umbel with 2 lanceolate hairy bracts at its base. *Flowers* .25 in. long, subsessile. *Calyx*-tube cylindric, densely hairy, its lobes linear. *Corolla* tubular, with 5 deep ovate-acute teeth, pilose externally. *Fruit* sub-globular, black, crowned by the sub-coherent calyx-lobes, .3 in. in diam.

SINGAPORE: *Ridley* 9516.—DISTRIB. BORNEO: *Barber* 249.

3. *GEOPHILA RENIFORMIS*, Don. Prodr. 136. *Stem* as thick as a crow-quill, 6 to 18 in. long, glabrous, the branches short. *Leaves* broadly ovate-cordate to reniform, the apex sub-acute or obtuse; upper surface brown when dry, the lower paler, both glabrous, the main-nerves mostly radiating from the base of the midrib, 3 or 4 pairs, not prominent; length .5 to 1.5 in.; breadth .5 to 1.75 in.; petioles .35 to 2 in., often puberulous. *Stipules* small, semilunar, the apex reflexed. *Peduncles* slender, .5 to 2 in. long, slender, 1- to 3-flowered. *Flowers* .6 in. long, without pedicels, with lanceolate bracts at their bases. *Calyx*-lobes deep, narrowly lanceolate. *Corolla* much exceeding the calyx, its lobes lanceolate, glabrous or pubescent externally. *Berry* red, crowned by the calyx-lobes, sub-globular, .35 in. in diam. DC. Prodr. IV. 537; W. & A. Prodr., 436; Wight Icon. t. 54; Dalz. & Gibs. Fl. Bomb. 111; Miq. Fl. Ind. Bat. II. 311; Hook. fl. Fl.-Br. Ind. III. 178. *G. diversifolia*, DC. l.c., Wall. Cat. 8325. *Psychotria herbacea*, Linn. Sp. Pl. 245; Roxb. Fl. Ind. I. 533. *Cephaelis herbacea*, Kurz in Journ. As. Soc. Beng. 1877, II. 140. *C. diversifolia*, Bl. Bijdr. 1004.

MALACCA: *Maingay* (K.D.) 927; *Goodenough* 1526. PERAK: *Scortechini* 130, 2183; *Wray* 3368; *King's Collector* 265, 905. PENANG: *Curtis* 1930; *Deschamps*. POONGAH: *Curtis* 3235. KEDAH: *Curtis*.—DISTRIB. Malayan Archipelago, Ceylon, British India, Andaman Islands, Polynesia, S. China, tropical America and Africa.

4. *GEOPHILA MELANOCARPA*, *Ridley* in Trans. Linn. Soc. (2) III. 313, t. 62. *Stems* 6 to 18 in. long, compressed, as thick as or thicker

than a crow-quill, glabrous. *Leaves* thickly membranous, oblong-ovate; slightly cordate at the base, the apex sub-acute, the edges slightly waved; both surfaces glabrous, pale olivaceous-brown, the reticulations, midrib, and 3 to 5 pairs of ascending main-nerves prominent; length 1·75 to 3 in.; breadth ·75 to 1·5 in.; petiole 1 to 2·5 in.; puberulous. *Stipules* lanceolate, 1 in. long. *Peduncle* terminal, slender, ·75 to 3 in. long, compressed, bearing an umbel of 6 to 9 flowers with an involucre of linear blunt bracts at its base. *Flowers* 6 in. long, on glabrous pedicels much shorter than themselves. *Calyx-tube* ·25 in. long; its lobes longer, oblong, obtuse. *Corolla-tube* about ·25 in. long, its lobes shorter, oblong, blunt. *Stamens* included. *Fruit* fleshy, broadly ovoid, black when ripe, shining, ·35 in. in diam. and (including the persistent calyx-teeth) slightly longer; pyrenes ·25 in. long, plano-concave with a ridge on each side.

PERAK: *Scortechini* 129; *King's Collector* 10134. MALACCA: *Ridley* 1608. SELANGOR: *Ridley* 8569.

5. *GEOPHILA SCORTECHINII*, King, n. sp. *Stem* prostrate, rather thicker than a crow-quill, obscurely 4-angled, 1 or 2 feet long; the branches short, erect. *Leaves* sub-fleshy, ovate or ovate-elliptic, base narrowed or rounded; both surfaces with sparse very minute white adpressed hairs; upper (when dry) pale-brown, the nerves indistinct; lower yellowish, the midrib and the 3 or 4 pairs of much curved ascending nerves slightly prominent; length 1 to 1·5 in.; breadth ·6 to ·9 in.; petioles ·35 to ·75 in. *Peduncles* terminal, about as long as the leaves, slender, compressed, bracteate, dichotomous near the apex and bearing two small linear bracts at each bifurcation. *Flowers* few, on short bracteolate pedicels, ·6 in. long (to the end of the long style). *Calyx* with a long narrow tube, and 5 long linear acuminate lobes puberulous outside. *Style* very long, filiform.

PERAK: *Scortechini*.

CEPHAELIS, Swartz.

Undershrubs or perennial herbs, usually erect. *Leaves* oblanceolate, obovate or oblong; stipules usually solitary, connate at the base (in the Malayan species). *Flowers* in involucrate heads. *Calyx* with a funnel-shaped tube and (in the Malayan species) an entire persistent limb. *Corolla* funnel-shaped or salver-shaped, its throat naked or hairy; lobes of the limb 4 or 5, erect or spreading, valvate. *Stamens* 4 or 5, inserted in the mouth of the corolla-tube, usually shortly exserted. *Anthers* oblong or linear, dorsifixed. *Ovary* 2-celled (rarely 3- or 4-celled). *Style* long or short. *Ovules* 1 in each cell, basal, erect. *Fruit* dry or fleshy, of two plano-convex pyrenes. *Seeds* plano-convex, their

testa membranous, albumen horny. *Embryo* small, basal, the cotyledons leafy.—*DISTRIB.* Species about 70, all tropical.

Stipules coriaceous, their bases coriaceous and leaving bold scars on the stem:—

Capitula sessile, 1 to 3 in. across; leaves 3 to 5 in. broad;

stipules broadly ovate, .8 in. long ... 1. *C. Griffithii*.

Capitula pedunculate, .75 to 1 in. across; leaves .5 to 3.5

in. broad; stipules coriaceous, broadly ovate with dis-

coloured edges, .1 to .5 in. long ... 2. *C. cuneata*.

Stipules not coriaceous, leaving no scars on the stem ... 3. *C. Ridleyi*.

1. *CEPHAELIS GRIFFITHII*, Hook. fil. Fl. Br. Ind. III. 178. Young branches thicker than a swan-quill, lenticellate. *Leaves* membranous, oblong-oblanceolate, shortly and rather abruptly acuminate, gradually narrowed from above the middle into the long slightly winged petiole, both surfaces glabrous, brown when dry, the lower the paler; main-nerves 12 to 20 pairs, curving upwards, prominent like the midrib on the lower surface, rather faint on the upper surface when dry; length 10 to 16 in.; breadth 3 to 5 in.; petioles 2.5 to 3 in. *Stipules* coriaceous, sub-orbicular, their apices sub-acute, .8 in. long, the margins entire, thin, and discoloured. *Capitulum* sub-globular, from 1 to 2 in. in diam., sessile or shortly stalked, bearing numerous orbicular bracts like the stipules, but smaller. *Flowers* .75 in. long, on short pedicels. *Calyx* .15 in. long, the tube narrow-cylindric; the mouth abruptly campanulate, entire, truncate. *Corolla* funnel-shaped, .65 in. long, mouth with 5 ovate-acute reflexed lobes. *Fruit* .35 in. long, compressed, slightly grooved along the edges, with a broad dorsal rib on each side, crowned by the calyx-limb. *Seed* thin.

MALACCA: *Griffith* (K.D.) 3032; *Maingay* (K.D.) 928. NEGRI SEMBILAN: *Ridley* 10109. PERAK: *King's Collector* 746, 2534, 6251, 6399, 10782; *Wray* 1197, 1338, 3027; *Ridley* 9755; *Scortechini*.—*DISTRIB.* SUMATRA: *Forbes*, 2511.

Differs from *C. cuneata* in the longer and sessile capitulum and somewhat larger leaves and stipules.

2. *CEPHAELIS CUNEATA*, Korth. in Ned. Kruidk. Arch. II. 248. A shrub; young branches thinner than a goose-quill, glabrous, the nodes sometimes close together and always marked by the pale coriaceous bases of the deciduous stipules. *Leaves* thickly membranous, oblanceolate or elliptic-oblanceolate, gradually narrowed from above the middle into the slightly winged petiole; both surfaces glabrous, olivaceous when dry, the lower the paler; main-nerves 10 to 18 pairs, curved, spreading and ascending, indistinct on the upper surface when dry but distinct on the lower, the midrib broad; length from 5 to 10 in.; breadth 1 to 2.5 in.; petioles narrowly winged, .5 to 1.5 in. long. *Stipules*

coriaceous, broadly ovate and about .5 in. long or forming small shallow, cups .1 in. deep always with more or less broad discoloured edges. *Capitulum* pedunculate, from 8 to about 1.25 in. in diam. enveloped in thickly membranous, veined, involueral bracts, the inner being mostly orbicular-oblong but the two or three lower (external) elongate-oblong and connate; the peduncle from 1 to 3 in. long, ebracteate. *Flowers* .75 in. long. *Calyx* only .15 in. long, cylindric but widening slightly at the truncate apex. *Corolla* .65 in. long, infundibuliform, the mouth with 5 short triangular reflexed lobes. *Anthers* linear-oblong, their apices slightly exerted. *Disk* large and deep. *Style* longer than the anthers; stigma fleshy, 2-lobed, exerted. *Fruit* .4 in. long, compressed, deeply grooved on the edges and with a stout dorsal ridge on each side, crowned by the calyx.

MALACCA: *Griffith* (K.D.) 3085; *Goodenough* 1979; *Derry* 609; *Main-gay* (K.D.) 929; *Hullett* 790. SINGAPORE: *Ridley* 4966. JOHORE, *King*; *Ridley* 3733, 6405. PAHANG: *Ridley* 2198. PERAK: *Scortechini* 343; *Ridley* 2924; *King's Collector* 1104, 6218; *Wray* 1497, 1977.

Sir Joseph Hooker considers *C. cuneata*, Korth. to be a species, and in deference to his opinion we have kept it up. The two chief characters, on which he relies to separate it from *C. Griffithii* are the pedunculate inflorescence and the narrower leaves. But, in a large suite of specimens, these break down, for there are specimens in which distinct peduncles are associated with the broadly oblanceolate leaves of *C. Griffithii*. A third and minor character used to separate the two is the size of the stipules,—those of *C. Griffithii* being 1 in. in diam., and those of *C. cuneata* only .25 in. But, here again, there are numerous variations which do not fit in as distinctive marks with the other two characters. I think it might be better to treat *C. cuneata* as a variety of *C. Griffithii*, referring to it (amongst the specimens cited above) only *Griffith* 3085, *Maingay* 929 and *Hullett* 796.

3. *CEPHAELIS RIDLEYI*, King, n. sp. Like *C. Griffithii*, but with rather narrowly elliptic leaves, tapering to each end, the main-nerves faint and only 8 to 10 pairs, 8 or 9 inches in length and from 2.5 to 3 in. in breadth; stipules lanceolate not coriaceous, the capitules shortly trichotomous, 2.5 to 3 in. in diam. on thick peduncles 1 in. long, subtended by two boat-shaped bracts 1.35 in. long, flowers shorter than the lanceolate inner bracteoles.

SINGAPORE: *Ridley* 9515; *Yapp* 433. PENANG: *Curtis*. SELANGOR: *Ridley* 7417.

51. LASIANTHUS, Jack.

Shrubs or small trees, often foetid, with terete branches often compressed at the nodes. *Leaves* distichous, more or less acuminate (often very much so), the veins transverse and often distinct; stipules usually broad. *Flowers* small, in axillary, often bracteate, sessile (rarely pedun-

clod), fascicles on condensed cymes. *Calyx-tube* short; the limb with 3 to 5 long or short persistent teeth, sometimes truncate. *Corolla* funnel- or salver-shaped, its throat villous; the limb with 3 to 7 valvate lobes. *Stamens* 4 to 6, inserted by short filaments on the throat, often apiculate, included. *Style* long or short, stigmas 3 to 9, short, blunt; ovules 1 in each cell, basal, erect, usually linear. *Drupe* small, containing 3 to 9 triquetrous 1-seeded pyrenes. *Seeds* narrow, with membranous testa; embryo terete; radicle slender, inferior.—*DISTRIB.* About 50 species, mostly tropical Asiatic.

A genus resembling in facies *Urophyllum*; but distinguished from that by its 1-seeded pyrenes and deeply-lobed, not truncate, calyx-limb; also by its larger stipules, and shorter corolla-tube.

Flowers 4-5-merous:—

Glomeruli hemispheric, sessile, not longer than the petioles; bracts and flowers numerous:—

Glomeruli partially or entirely covered (at least when young) by the persistent, often coriaceous, stipules; leaves usually more than 8 in. long; bracts longer than the flowers (except in No. 43, VAR.):—

Leaves elliptic-oblong, hispidulous on both surfaces
Leaves oblanceolate, glabrous on the upper surface,
pubescent, (usually minutely so) on the lower ...
Leaves oblong-lanceolate, glabrous on both surfaces

1. *L. scabridus.*
2. *L. Griffithii.*
3. *L. stipularis.*

Glomeruli not covered by the more or less deciduous stipules, bracts longer than the flowers:—

Bracts unequal, diminishing in size inwards; the
outer ovate-lanceolate often 1 in. long; the inner
lanceolate or linear; pubescence of leaves rusty ...
Bracts uniform, all linear and densely hispid; leaves
oblong-lanceolate, thickly coriaceous, rugulose and
glabrous on the upper surface; the lower softly pu-
bescent
Bracts uniform, all broad; leaves membranous; pu-
bescence of leaves yellowish... ..

4. *L. cyanocarpus.*
5. *L. rhinocerotis.*
6. *L. inæqualis.*

Cymes twice as long as the petioles with few flowers and
few linear hirsute bracts shorter than the flowers; leaves
coriaceous, elliptic-lanceolate acute, glabrous above (ex-
cept the midrib), softly hairy and reticulate below, main-
nerves 11 to 13 pairs; pyrenes 5 to 7

7. *L. pilosus.*

Cymes not much longer than the petioles with few flow-
ers but many linear softly hairy bracts longer than the
flowers; leaves membranous, narrowly elliptic, some-
what oblanceolate, quite glabrous above; main-nerves
8 or 9 pairs

8. *L. Ridleyi.*

- Cymes about as long as the petioles with few flowers and many linear pubescent bracts shorter than the flowers; leaves thinly membranous, narrowly elliptic acuminate, glabrous above and minutely pubescent beneath; main-nerves 5 or 6 pairs; pyrenes 4 ... 9. *L. flavicans*.
- Cymes shorter than the petioles, few-flowered, bracts few:—
 Leaves 8 to 10 in. long:—
 All parts quite glabrous; bracts small, fimbriate leaves 4·5 to 6 in. long ... 10. *L. longifolius*.
- Leaves pubescent at least below, more or less oblanceolate, bracts linear:—
 Main-nerves of leaves 4 pairs ... 11. *L. constrictus*.
 Main-nerves of leaves 6 to 8 pairs —
 Stipules linear, hirsute, as long as the petioles; calyx 1 in. long; corolla 3 in. long, its lobes narrow ... 12. *L. singaporensis*.
 Stipules triangular, sub-acute or bifid; calyx 25 in. long; corolla shorter than the calyx, its lobes oblong, blunt ... 13. *L. ellipticus*.
 Leaves elliptic-ovate, tapering to each end, nearly glabrous; main-nerves 4 to 6 pairs, faint like the reticulations; bracts linear; flowers under 1 in. long ... 14. *L. subspicatus*.
 Leaves oblong-lanceolate; main-nerves 5 pairs, ascending, the reticulations horizontal, strong, puberulous on the under surface; bracts broad; flowers 15 in. long ... 15. *L. Wrayi*.
 Leaves oblong, acute at both ends, under surface pubescent everywhere; main-nerves 6 or 7 pairs, ascending; bracts oblong, acuminate, flowers 3 in. long. ... 16. *L. Kurzii*.
- Leaves 2 to 4 in. long, much narrower than long:—
 Bracts of cymes large, broadly ovate to elliptic ... 17. *L. sub-inaequalis*.
 Bracts of cymes linear:—
 Upper surfaces of leaves quite glabrous; calyx-lobes crowning the fruit, 25 in. long; pyrenes 5 ... 18. *L. coronatus*.
 Upper surfaces of leaves glabrous except for a few hairs on the midrib; calyx teeth on the fruit short; pyrenes 8 ... 19. *L. appressus*.
 Upper surfaces of leaves glabrous except the cinereous-tomentose midrib; under surfaces minutely pilose; bracts of cyme lanceolate or oblanceolate, tapering to each end; flowers 4-merous ... 20. *L. attenuatus*.
 Both surfaces of the leaves and all parts of the plant with coarse flexuose hairs with bulbous bases; bracts of cyme linear, hispid; flowers 5-merous ... 21. *L. densifolius*.
- Cymes ebracteate, sessile, shorter or rarely a little longer than the leaf-petioles:—
 Leaves quite glabrous on both surfaces:—

Leaves 7 to 12 in. long and 2.5 to 3.5 in. broad:—

Lower surfaces of leaves at first puberulous, afterwards quite glabrous, their main-nerves 16 to 20 pairs: stipules .4 in. long, coriaceous, sagittate; calyx shortly campanulate, .1 in. long, obscurely 4- or 5-toothed; fruit sub-globular, glabrous, 6-ridged; pyrenes 5 or 6

22. *L. robustus.*

Lower surfaces of leaves always quite glabrous; main-nerves of leaves 10 to 12 pairs; stipules .2 in. long, triangular, acuminate; calyx .15 in. long, widely tubular, the mouth truncate, fruit hairy; pyrenes 4

23. *L. coriaceus.*

Main-nerves of leaves 10 pairs; stipules .15 in. long, broadly triangular with abrupt oblong apices: calyx .25 in. long, tubular, the mouth truncate but obscurely 4-toothed

24. *L. pergamaeus.*

Leaves 3.5 to 6 in. long:—

Leaves elliptic or oblanceolate-elliptic, 1.35 to 2.5 in. broad; main-nerves 5 pairs; fruit ellipsoid, 4-ridged, .45 in. long; pyrenes 4, rugulose

11. *L. constrictus.*

Leaves oblong-lanceolate, 1 to 1.4 in. broad; main-nerves 8 or 9 pairs; fruit sub-globose, .2 in. in diam.; pyrenes 4, smooth

25. *L. malaccensis.*

Leaves quite glabrous on both surfaces except for a few adpressed hairs on the lower part of the midrib on each, elliptic-oblong, sharply acuminate, 5 to 6.5 in. long and 1.5 to 2 in. broad; main-nerves 8 or 9 pairs... ..

26. *L. chinensis.*

Leaves glabrous on both surfaces except the midribs and 10 to 13 pairs of main-nerves, adpressed-puberulous on both, elliptic-oblong, 3 to 4.25 in. long and 1.25 to 1.5 in. broad

27. *L. Wightianus.*

Leaves quite glabrous above, minutely sub-strigose below, elliptic or oblong-elliptic, bluntly acuminate or sub-acute:—

Leaves with 10 or 12 pairs of main-nerves

28. *L. pterospermus.*

Leaves with 3 or 4 pairs of main-nerves... ..

11. *L. constrictus.*

Leaves glabrous on the upper surface, the lower sparsely pilose everywhere

7. *L. pilosus*

VAR. *angustifolius*

Leaves glabrous on the upper surface, the lower hairy on the midrib and main-nerves:—

Leaves 6 to 10 in. long, elliptic or obovate-elliptic; main-nerves 7 or 10 pairs

29. *L. perakensis.*

Leaves 3 to 7 in. long:—

Leaves narrowly oblong-lanceolate, five or six times longer than broad, their apices caudate-acuminate:—

Neither surface of leaves scaly; main-nerves 12 to 14 pairs; cymes 2-to 3-flowered; mouth of

- calyx with 5 triangular acuminate lobes; corolla tubular, its lobes pubescent; pyrenes 4 or 5 ... 30 *L. angustifolius*.
- Both surfaces of leaves minutely scaly; main-nerves about 7 pairs; cymes 5- to 7-flowered; mouth of calyx truncate, entire; corolla silver-shaped, the lobes densely hirsute; pyrenes 7 or 8 ... 31 *L. oblongus*.
- Leaves 5 or 6 in. long, oblong, sub-acute or shortly and bluntly acuminate; under surface sub-glabrous between the 9 to 11 pairs of adpressed-tomentose main-nerves and veins; calyx cupular-campanulate with 5 triangular teeth ... 7 *L. pilosus*.
- Leaves 3 to 4.5 in. long, ovate-lanceolate, shortly acuminate; under surface glabrous except the pubescent midrib and 5 or 6 pairs of pubescent main-nerves; calyx with 5 long unequal linear-lanceolate lobes ... 32. *L. montanus*.
- Leaves 2.5 to 3.5 in. long, lanceolate or elliptic-lanceolate, long-acuminate; under surface softly pubescent on the 4 to 6 pairs of main-nerves; calyx with 5 sub-equal linear-lanceolate lobes; fruit sub-globular, sparsely pilose; pyrenes 5 ... 33. *L. Curtissii*.
- Leaves never more than 3 in. long, elliptic-lanceolate, acuminate, glabrous above, reticulate beneath and adpressed-puberulous on the 6 or 7 pairs of bold main-nerves; calyx-lobes 5, linear-lanceolate, unequal ... 34. *L. pseudo-lacinius*.
- Leaves never more than 1.5 in. long, oblong-lanceolate, acute or sub-acute, glabrous except the lower surfaces of the 6 to 8 pairs of minutely adpressed-puberulous main-nerves; calyx-teeth short triangular; pyrenes 4 ... 35. *L. nervosus*.
- Leaves scaberrulous on the upper surface, the lower scabrid-puberulous between the softly puberulous 4 to 6 pairs of main-nerves, elliptic or ovate-elliptic, 4 to 5 in. long; calyx narrowly campanulate ... 36. *L. Harveyanus*.
- Leaves sparsely clothed with stiff bulbous hairs on the upper surface, the lower with more numerous shorter hairs, oblong-lanceolate, much acuminate; main-nerves 16 to 18 pairs; calyx with 5 deep lanceolate lobes ... 37. *L. ferrugineus*.
- Leaves sparsely and minutely strigose on the upper surface, pilose on the lower, but the 7 to 10 pairs of main-nerves and the midrib tomentose on the latter surface; length 2.5 to 3.5 in.; calyx campanulate with sub-truncate obsolete toothed mouth ... 38. *L. tomentosus*.
- Inflorescence solitary, on peduncles much exceeding the petioles in length:—

Peduncles rather short, 3- to 5-flowered; leaves

- narrowly elliptic-oblong, coriaceous, 4 to 5 in. long; almost glabrous, the reticulations bold and horizontal ... 39. *L. scalariformis*.
 Peduncles filiform, 1- to 2-flowered; leaves 2 to 3 in. long, sessile or nearly so, broad and unequal at the base; both surfaces more or less hispidulous-pubescent ... 40. *L. filiformis*.
 Peduncles filiform, 1-to 3-flowered, leaves under 1 in. long, petiolate, sub-rhomboidal or ovate; glabrous except sometimes the midrib at its base on the lower surface ... 41. *L. gracilis*.

Flowers 3-merous:—

- Calyx and corolla 3-cleft; anthers and pyrenes each 3:—
 Leaves 5·5 to 8·5 in. long, narrowly elliptic or sub-obovate-elliptic, usually glabrous; reticulations distinct, especially below, as are the 5 or 6 pairs of main-nerves; flowers puberulous; fruit obliquely elliptic ... 42. *L. Maingayi*.
 Leaves 3·5 to 6 in. long, oblong-elliptic or lanceolate, everywhere glabrous; reticulations and 7 to 10 pairs of main-nerves faint; fruit depressed-trigonus or subdidymous; pyrenes with a transverse partition and thus falsely 2-celled ... 43. *L. ~~tuidus~~ Lowianus*.

1. *LASIANTHUS SCABRIDUS*, King & Gamble, n. sp. Young branches about as thick as a goose-quill, glabrous, black when dry. *Leaves* coriaceous, oblong or oblong-elliptic, shortly acuminate, the base narrowed and usually slightly unequal; both surfaces pale-brown when dry, rugulose reticulate, scaberulous from numerous short stiff hairs with large bulbous bases, the midrib prominent and hirsute, the main-nerves and veins depressed, under surface with non-bulbous hairs longer and softer than those of the upper; the midrib and 10 to 13 pairs of curved spreading main-nerves hirsute like the midrib; length 4·5 to 8 in.; breadth 1·35 to 2·35 in.; petiole ·5 to ·7 in.; hirsute; stipules broadly triangular-acute or obtuse, thickly coriaceous, glabrous, ·4 or ·5 in. long, and nearly as broad, persistent. *Glomeruli* somewhat shorter than the petioles, sessile, dense, many-flowered, partly covered by the stipules when young, bearing very numerous linear obtuse bracts, black, glabrous and shining on their posterior surface, but on the edges and in part covered with coarse bristly hairs. *Flowers* few, sessile, much shorter than and concealed amongst the bracts. *Calyx* narrowly campanulate with a glabrous tube, and 5 lanceolate pubescent lobes. *Fruit* glabrous, except the persistent calyx-lobes, about ·2 in. long; pyrenes 5, rugulose.

JOHORE: *Ridley* 6463, 11170, 7112.

2. *LASIANTHUS GRIFFITHII*, Wight in Calc. Journ. Nat. Hist. VI, 505. Young branches as thick as a swan's-quill, terete below but compressed in the very young parts, sparsely and deciduously pubescent, ultimately sub-glabrous, dark-coloured when dry. *Leaves* large, thickly

coriaceous, oblanceolate-elliptic, shortly acuminate, the base acute; both surfaces pale-brown tinged with olivaceous; the upper quite glabrous, often rugulose from the depression of the nerves and reticulations; the midrib not depressed but channelled near the base; under-surface paler, the bold midrib, nerves and veins, and their interspaces in a less degree pubescent; length 8 to 12 inches; breadth 3 to 4 in.; petioles .3 to .5 in., winged above; stipules broadly triangular, obtuse or acute, coriaceous, partly covering the inflorescence when young, more or less persistent. *Glomeruli* somewhat longer than the petioles, hemispheric, condensed, many-flowered; flowers sessile, .2 in. long, imbedded amongst numerous linear densely hirsute bracts somewhat longer than themselves. *Calyx* tubular-campanulate or campanulate, narrowed to the base, glabrous except the hirsute ovate or lanceolate lobes. *Corolla* in the perfect flowers .3 in. long, salver-shaped, the tube narrow, glabrous except the villous throat; the limb with 5 narrowly lanceolate hirsute reflexed lobes. *Anthers* 5, exserted beyond the dense villous hairs of the throat, linear-oblong; filaments short. In *cleistogamic flowers* (which are numerous) the corolla smaller than the calyx but resembling it, 5 or 6 lobed. *Fruit* glabrous, ovoid, crowned by the slightly accrescent calyx-lobes, about .2 in. long; pyrenes 5. Hook. fil. Fl. Br. Ind. III. 179.

MALACCA: Griffith (K.D.) 2935. JOHORE: Ridley 11177, 11179. SINGAPORE: Ridley 4121. PERAK: King's Collector 496.—DISTRIB. Borneo; Haviland 84.

VAR. *latibracteata*, King & Gamble; bracts of inflorescence broad, obtuse, glabrous outside, hirsute inside, shorter than the flowers, often becoming thick, white and polished when old, persistent.

SELANGOR: Ridley 10196. PERAK: Ridley 9528; Scortechini 612.

3. *LASIANTHUS STIPULARIS*, Blume Bijdr. 997. A slender shrub 3 to 6 feet high; all parts except the bracts and lobes of corolla inside glabrous: young branches half as thick as a goose-quill, dark-coloured when dry, smooth. *Leaves* membranous, oblong-lanceolate, shortly and rather abruptly cordate-acuminate, narrowed from below the middle to the short petiole; both surfaces pale-brown when dry, glabrous, the upper shining; main-nerves 9 to 12 pairs, curved, rather distinct on both surfaces, the midrib grooved on the upper, prominent on the lower surface; the main-nerves distinct on both; length 5 to 7 in.; breadth 1.5 to 2 in.; petioles .25 to .35 in. long. *Stipules* broadly ovate-cordate, sub-acute, .5 to .6 in. long, completely covering the inflorescence. *Flowers* nearly .3 in. long, on very short flat pedicels, surrounded by numerous unequal narrowly lanceolate densely hirsute bracts longer than themselves. *Calyx* campanulate, ridged; the mouth with 4 or 5 broadly triangular acute teeth. *Corolla* thrice as long as the calyx; the tube

cylindric; the lobes 4 or 5, oblong, blunt, villous inside. *Stamens* 4 or 5, on short compressed filaments; anthers oblong, their tips exerted. *Fruit* ovoid-glabrous, sub-ligneous, glabrous, with 8 to 10 vertical ridges, crowned by the calyx-lobes, .25 in. long, and .2 in. in diam., 4- or 5-celled, with a single compressed erect seed in each cell. Kurz Fl. Burm. II. 32. Hook. fil. Fl. Br. Ind. III. 179. *Mephitidia stipularis*, DC. Prod. IV. 453.

SINGAPORE: Ridley 4903, 6559, 10419; King. SELANGOR: Ridley 8230, 8575. PERAK: Scortechini 213; Wray 2019; Ridley 9743; King's Collector 340.—DISTRIB. Malay and Andaman Archipelagos.

4. *LASIANTHUS CYANOCARPUS*, Jack in Trans. Linn. Soc. XIV. 125. A shrub 6 to 8 feet high; all parts more or less tawny- or rusty-hirsute, the hairs shining and often flexuose; young branches half as thick as a goose-quill. *Leaves* coriaceous, oblong, oblong-elliptic or oblanceolate-oblong, shortly acuminate, the base somewhat narrowed, unequal-sided; upper surface dark olivaceous-brown when dry, the lower paler with the transverse veins distinct; main-nerves 7 to 10 pairs, curved, spreading and ascending, bold on the lower surface, depressed on the upper when dry; length 4.5 to 6.5 in.; breadth 1.65 to 2.25 in.; petioles .15 to .25 in. *Stipules* narrowly triangular, acuminate, .2 in. long. *Cymes* sessile, shorter than the petioles, enveloped by a number of densely hirsute bracts diminishing in size inward; the outer ovate-lanceolate acuminate and often 1 in. or more in length; the inner much smaller, lanceolate or linear. *Flowers* only 3 or 4, sessile, concealed amongst the numerous bracts, only about .25 in. long and shorter than even the innermost bracts. *Calyx* longer than or about as long as the corolla, campanulate, with 4 or 5 long narrow hirsute lobes. *Corolla* tubular, glabrous inside; its lobes oblong, blunt. *Anthers* oblong, blunt, almost sessile. *Fruit* ovoid-globular, glabrous, but crowned by the long hirsute calyx-lobes, .2 to .25 in. long, separating into 4 or 5 three-sided, one-seeded pyrenes. Kurz For. Fl. Burma, II. 32; Hook. fil. Fl. Br. Ind. III. 179. *L. bracteatus* and *L. Roxburghii*, Wight in Calc. Journ. Nat. Hist. VI. 501, 502. *L. oculus-Cati*; Miq. Fl. Ind. Bat. II. 315. *L. laevicaulis*, Kurz in Trimen's Journ. Bot. 1875, p. 327. *Lasianthus*? Wall. Cat. 8440. *Mephitidia cyanocarpa*, DC. Prod. IV. 452. *M. rhinozerotis*, Kurz in Andaman Report, Append. A. 40; (not of Blume?). *Triosteum hirsutum* Roxb. Fl. Ind. I. 538. *Rubiacea*, Wall. Cat. 8305.

In all the Provinces, common.—DISTRIB. British India, Malay Archipelago.

VAR. *subsessilis*; petioles only about .1 in. long, bases of leaves oblique.

PERAK: Ridley 9730; King's Collector 472; Scortechini 1207.

Wall. Cat. 8440 belongs here.

5. *LASIANTHUS RHINOCEROTIS* Blume Bijdr. 996. A shrub or small tree; young branches rather thinner than a goose-quill, covered like the petioles with dense short rusty-tomentum. *Leaves* coriaceous, narrowly oblong-lanceolate, acute, the base rounded; upper surface glabrous, the midrib depressed when dry, the nerves depressed, the veins inconspicuous; lower surface everywhere hairy, the 10 to 12 bold oblique ascending little-curved main-nerves and the stout midrib tomentose; the prominent transverse veins pubescent and the interspaces puberulous; length 4 to 7 in.; breadth 1.5 to 2.25 in.; petioles .25 in. long; stipules broadly triangular acute, pilose, .1 to .2 in. long. *Glomeruli* sessile or on short pedicels, axillary, bearing very numerous narrow bracts, the outer linear, the inner subulate, all softy rusty-pilose, mostly .5 or .6 in. long, the inner sometimes shorter. *Flowers* much shorter than the bracts and concealed by them, few, sessile or subsessile. *Corolla* with 5 deep concave lobes, pilose outside. *Fruit* ovoid, pointed, blue, about .15 in. long, separating into 5 three-cornered pyrenes. Miq. Fl. Ind. Bat. II. 315. *Mephitidia rhinocerotis* DC. Prod. 453; Korthals in Ned. Kruidk. Arch. II. 220.

PERAK: at elevations of 4500 feet and upwards. *Scortechini* 532, 537; *Wray* 237; *King's Collector* 3209, 3809. SELANGOR: *Kelsall* 1993. —DISTRIB. Java.

Closely allied to *L. crinitus* Jack, but differing in the characters of the hairs and bracts. In that species the outer bracts are much longer than the inner; in this the outer bracts are not longer and only slightly broader than the inner.

6. *LASIANTHUS INAEQUALIS*, Blume Bijdr. 996. A shrub; young branches twice as thick as a crow-quill, densely tawny-pilose like the petioles. *Leaves* membranous, olivaceous-green when dry, elliptic, oblanceolate-elliptic or oblong, shortly acuminate, more or less narrowed to the rounded, sometimes slightly oblique, base; upper surface shining, glabrous, except the bold pilose midrib and puberulous nerves, minutely reticulate; lower surface softly and sparsely pilose; length 3 to 5.5 in.; breadth 1 to 2 in.; petiole .2 to .25 in.; stipules linear, pilose, .6 or .7 in. long, deciduous. *Glomeruli* axillary, twice as long as the petioles, few-flowered, the bracts broadly ovate, abruptly acuminate, bearing much yellow hair, especially externally, .7 in. in length. *Flowers* .35 in. long, sessile. *Calyx* campanulate, with 4 deep unequal lanceolate spreading lobes. *Corolla* shorter than the calyx, with a short tube and 4 oblong lobes, glabrous inside, but outside covered like the calyx with long yellow hair. *Anthers* ovate, almost sessile. *Fruit* narrowly ovoid, sparsely hairy, crowned by the accrescent connivent calyx-lobes; length .35 in. (of which nearly half is calyx); pyrenes 4, three-sided, rugose.

PENANG: at 1500 feet; *Curtis* 760. PERAK: *Ridley* 9726.

A very distinct species and not resembling *L. cyanocarpus* Jack, to which some authors have reduced it. It is much more nearly allied to *L. subinæqualis*, King & Gamble.

7. *LASIANTHUS PILOSUS*, Wight in Calc. Journ. Nat. Hist. VI. 506. A shrub or small tree; young branches about as thick as a goose-quill; covered like the petioles and undersurfaces of the leaves (and often the stipules and inflorescence) with very dark short rusty tomentum, sometimes tinged with green. *Leaves* coriaceous, dark olivaceous-brown when dry, oblong or elliptic-lanceolate, the apex sub-acute or shortly and abruptly acuminate, the base sub-cuneate or rather rounded; both surfaces boldly and transversely reticulate when dry; the upper sparsely pilose or glabrous except sometimes the depressed faint midrib, hirsute; the lower sub-glabrous or sparsely hairy between the prominent adpressed-tomentose main-nerves, the midrib bold on the lower surface, depressed and glabrous on the upper; main-nerves 9 to 13 pairs, curved, ascending; length 4.5 to 6 in.; breadth 1.25 to 2.5 in.; petiole .1 to .3 in.; stipules triangular-lanceolate, acute, hairy, about .1 in. long. *Cymes* glomerulate, sessile, few-flowered, longer (sometimes shorter) than the petioles. *Flowers* sessile; bracts shorter than the calyx, hirsute. *Calyx* about .2 in. long, cupular-campanulate, hirsute outside, with about 5 triangular teeth. *Corolla* 5- to 7-cleft, dirty purple, shortly campanulate. *Fruit* blueish-black and ultimately glabrous, sub-globular, not longer than the persistent calyx-lobes; pyrenes 5 to 7. Hook. fil. Fl. Br. Ind. III. 182. *L. setosus*, Wight in Calc. Journ. Nat. Hist. VI. 506; Hook. fil. Fl. Br. Ind. l.c. 181.

MALACCA: *Griffith* (K.D.) 2918; *Maingay* (K.D.) 869; *Cuming* 239; *Hervey*. PERAK: at elevations of about 5000 feet; *Wray* 876. JOHORE: *Ridley* 11180. SELANGOR: *Ridley* 8231.

VAR. *angustifolia*, King & Gamble; branches more hirsute and with greenish-brown tomentum; leaves rather membranous, their lower surfaces sparsely and shortly pilose between the nerves, 4 or 5 in. long and 1 to 1.15 in. broad; stipules lanceolate.

MALACCA: *Griffith*; *Maingay*. PERAK: *Scortechini* 374 P.—DISTRIB. Burma.

VAR. *glabra*, King and Gamble; leaves with only 9 to 11 pairs of nerves, their upper surfaces quite glabrous even on the midrib, the reticulations not depressed and not very distinct.

SELANGOR: *Ridley* 7424.

8. *LASIANTHUS RIDLEYI*, King & Gamble, n. sp. A shrub; young branches, petioles and under surfaces of the midribs of the leaves densely and softly pubescent. *Leaves* membranous, narrowly elliptic, somewhat

oblanceolate, sub-acute, tapering in the lower third to the slightly rounded base; both surfaces olivaceous when dry; the upper glabrous, shining, with the midrib and nerves slightly prominent; the lower paler with prominent transverse reticulations, downy between the veins; main-nerves 8 or 9 pairs, slightly curved, ascending, thin but distinct on the lower surface like the midrib; length 7 to 8 in.; breadth about 2.5 in.; petiole about .2 in.; stipules linear, hirsute. *Glomeruli* shorter than the petioles, bearing a few flowers hidden amongst numerous linear bracts with many pale spreading hairs. *Calyx* sessile, .15 in. long, narrowly campanulate; the tube glabrous; the lobes 5, acuminate, erect, covered outside with long stiff white hairs. *Corolla* and fruit unknown.

SINGAPORE: *Ridley* 3620a.

9. *LASIANTHUS FLAVICANS*, King & Gamble, n. sp. Young branches thinner than a goose-quill, clothed with dense short yellowish-brown deciduous tomentum like the petioles. *Leaves* thickly membranous, narrowly elliptic, the apex acuminate, the base cuneate; upper surface olivaceous-green, glabrous except the lower part of the midrib, the nerves indistinct, shining; lower surface darker and with much short minute pubescence, especially on the 5 or 6 pairs of sharply ascending bold main-nerves and conspicuous transverse veins; length 5 to 7 in.; breadth 1.25 to 2 in.; petiole .3 to .35 in. short; stipules shorter than the petioles while in flower (longer in fruit), oblong, blunt or acute, adpressed to the stem, pubescent. *Glomeruli* about as long as the petioles, few flowered, bearing numerous linear very pubescent bracts shorter than the flowers. *Flowers* few, sessile or nearly so, .3 in. long. *Calyx* narrowly campanulate, glabrous, constricted below the 4 large triangular, spreading sparsely hirsute teeth. *Corolla* twice as long as the calyx and exceeding the bracts, clavate in bud, glabrous outside except for a few hairs on the back of the lobes, villous inside, salver-shaped, the limb with 4 broad triangular teeth. *Anthers* 4, broadly ovate, on short filaments; style as long as the corolla. *Fruit* elliptic, pointed towards each end, the apex crowned by the small calyx-teeth, glabrous, .45 in. long, and .25 in. diam.; pyrenes 4, rugulose.

SINGAPORE: in the Botanical Garden jungle; *Ridley* 4394, 6927.

PERAK: *Scortechini*. PAHANG: *Ridley* 2223; *King's Collector* 10974.

VAR. *subylabra*, King, hairs short, often deciduous.

PERAK: *Curtis* 1334. SELANGOR: *Ridley* 4895.

10. *LASIANTHUS LONGIFOLIUS*, Wight in Calc. Journ. Nat. Hist. VI. 514. Shrub or small, tree? All parts quite glabrous; young branches yellowish thick as a goose-quill, black when dry. *Leaves* coriaceous, broadly narrowly elliptic, sometimes oblong or oblanceolate-elliptic, sub-in. (or shortly and bluntly acuminate, much narrowed to the petiole,

both surfaces shining, boldly and transversely reticulate, the lower scaberulous; main-nerves 11 to 13 pairs, curved, spreading and like the midrib very prominent and minutely hispid on the lower, less prominent and glabrous on the upper; length 8 to 10 in.; breadth 2 to 3.5 in.; petioles .3 to .4 in.; stipules nearly as long as the petioles, coriaceous, triangular, sub-acute or blunt, partly covering the inflorescence, deciduous. *Cymes* shorter than the petioles, sessile. *Flowers* 4 to 6, sessile, surrounded at their bases by small rufescent fimbriate bracts much shorter than themselves. *Calyx* .2 in. long, sessile, coriaceous, tubular, with 4 small blunt teeth, slightly puberulous outside. *Corolla* not seen. *Ovary* 4-celled, 4-seeded. Hook. fil. Fl. Brit. Ind. III. 187.

MALACA: *Griffith* (K.D.) 2936; *Maingay* (K.D.) 867. PERAK: *Wray*; *Ridley* 7190. SELANGOR: *Ridley* 4904.

11. *LASIANTHUS CONSTRICTUS*, Wight in Calc. Journ. Nat. Hist. VI. 515. A shrub; young branches twice as thick as a crow-quill, compressed or sub-terete, like the petioles sparsely and deciduously strigose. *Leaves* membranous or thinly coriaceous, narrowly elliptic or elliptic-oblong, sometimes oblanceolate-elliptic, the apex rather bluntly acuminate, the base cuneate or rounded; both surfaces pale-olivaceous, minutely reticulate, and more or less shining when dry; the midrib on the lower surface minutely and sparsely strigose, otherwise both glabrous; main-nerves only 3 to 5 pairs, ascending and little curved, thin but distinct; length 3.5 to 5.5 in.; breadth 1.25 to 2.5 in.; petioles .15 to .2 in., corrugated, sparsely pubescent; stipules shorter than the petioles, lanceolate, adpressed-hairy, deciduous. *Cymes* sessile, shorter than the petioles (sometimes slightly longer) condensed, 4- to 6-, rarely 10-flowered; bracts minute or more usually absent. *Flowers* small, sessile or sub-sessile. *Calyx* .1 to .15 in. long, thick, narrowly campanulate, constricted below the 4- (rarely 3- to 5-) toothed mouth; teeth triangular, spreading, sparsely hairy. *Corolla* longer than the calyx, funnel-shaped, glabrous outside, the tube .25 in. long, villous inside, the limb as long as the tube and with 5 sub-acute lobes. *Fruit* obliquely ellipsoid, tapering to each end, somewhat compressed, 4-ridged, rugulose, crowned by the small calyx, glabrous, .35 in. long; and .3 in. in diam.; pyrenes 4, sub-cylindric. Hook. fil. Fl. Br. Ind. III. 188 (excl. syn. Kurz Fl. Burm.) *Mephitidea* sp. Griff. Notul. IV. 267 t. 474, fig. 4.

SINGAPORE: *Ridley* 4902. SELANGOR: *Ridley*. BURMA: *Griffith*. PERAK: *King's Collector* 2564, 2780, 3591, 6065; *Scortechini*. PAHANG: *Ridley* 2222. JOHORE: *Ridley* 11183, 11189.—DISTRIB. Sumatra, *Beccari* P.S. 952; Borneo, *Haviland*.

12. *LASIANTHUS SINGAPORENSIS*, King & Gamble n. sp. A shrub?

Young branches, petioles and under surfaces of the leaf-midribs cinereous-pilose. *Leaves* thinly coriaceous, narrowly elliptic, more or less oblanceolate, tapering to each end, the apex obtusely acuminate; upper surface olivaceous when dry, glabrous, shining, the midrib distinct and channelled, the nerves rather faint; under surface pale-cinereous, minutely and softly pubescent, the 6 or 7 pairs of spreading ascending main-nerves bold like the transverse veins; length 5 or 6 in.; breadth 1.75 in.; petiole 2 in.; stipules linear, hirsute, about as long as the petioles. *Cymes* sessile, shorter than the petioles, 4- to 6-flowered; bracts 2 or 3 at the base of each flower, linear-hirsute, about as long as the calyx. *Flowers* 4 in. long, sessile. *Calyx* 1 in. long, campanulate, the tube narrow, the limb wide with 5 deep triangular acute spreading teeth. *Corolla* funnel-shaped, 3 in. long, outside glabrous except for a few hairs near the mouth, inside villous; lobes of the mouth 5, narrow. *Anthers* 5, narrowly oblong. *Fruit* unknown.

SINGAPORE: Ridley 9095.

13. *LASIANTHUS ELLIPTICUS* Wight in Calc. Journ. Nat. Hist. VI. 507. A tall shrub; young branches half as thick as a goose-quill, cinereous or sub-rusty adpressed-pilose like the petioles and under surfaces of the leaves. *Leaves* thinly coriaceous, olivaceous-brown when dry, narrowly elliptic or oblanceolate-elliptic, shortly acuminate, much narrowed to the base; upper surface glabrous, shining, the midrib, nerves and transverse veins rather distinct; main nerves 7 or 8 pairs, slightly curved, ascending, bold on the under surface like the midrib; length 4.5 to 6.5 in.; breadth 1.5 to 2 in.; petioles .15 to .25 in.; stipules broadly triangular-lanceolate, sub-acute or sometimes bifid, almost glabrous, shorter than the petioles. *Glomeruli* shorter than the petioles, few-flowered, sessile, bearing (mostly on the outside) a few hirsute lanceolate bracts. *Calyx* .25 in. long, widely campanulate, tapering much to the base, deeply divided into 5 triangular acuminate spreading lobes, densely hirsute externally, sparsely so internally. *Corolla* half as long as the calyx, divided almost to the base into 5 oblong blunt lobes, hirsute outside and glabrous inside. *Anthers* 5, short, sessile. *Fruit* unknown. Hook. fil. Fl. Br. Ind. III. 182.

PENANG: at an elevation of 2000 feet; Curtis 1594.

14. *LASIANTHUS SUBSPICATUS*, King & Gamble, n. sp. A small tree; young branches rather thinner than a goose-quill, 2-grooved like the petioles, under surfaces of the leaves and the inflorescence with minute, usually pale, flocculent deciduous pubescence. *Leaves* membranous, ovate-elliptic, much acuminate, the base cuneate; both surfaces brown when dry, the upper quite glabrous, the nerves and reticulations faint; the lower glabrous, except the midrib and nerves, the reticulations

distinct; main-nerves 4 to 6 pairs, oblique rather straight; length 3·5 to 5 in.; breadth 1·25 to 1·85 in.; petioles ·25 in.; stipules elongated triangular, acute, about as long as the petioles, the midrib keeled. *Cymes* spiciform, usually about as long as the petioles, their axes somewhat elongated, bearing a few broadly lanceolate, acute or acuminate bracts much shorter than the 6 to 12 flowers, all parts except the inside of the calyx and the corolla-tube on both surfaces covered with short rather thick hair. *Flowers* sessile, broadly clavate in bud, under ·1 in. long. *Calyx* as long as the corolla-tube, campanulate, with 5 small, spreading, triangular teeth. *Corolla-tube* much shorter than the sub-globular bluntly 5-lobed limb. *Anthers* 5, linear, embedded in the dense white hair which lines the inside of the lobes. *Fruit* unknown.

PENANG: *Curtis* 2476. PERAK: *Wray* 863.

15. *LASIANTHUS WRAYI*, King & Gamble, n. sp. A small tree; young branches twice as thick as a crow-quill, slightly compressed, densely adpressed-pubescent. *Leaves* thinly coriaceous, oblong-lanceolate, tapering much and about equally to each end; upper surface quite glabrous, shining, faintly reticulate, olivaceous-brown; lower surface darker, adpressed-pubescent on the midrib and 5 pairs of rather bold ascending little-curved nerves, the connecting veins bold, horizontal, puberulous, the areolæ glabrous; length 3·5 to 5 in.; breadth ·75 to 1 in.; petioles about ·3 in.; stipules triangular, acuminate, much shorter than the petioles. *Flowers* ·15 in. long, two or three on a very short axillary tubercle having a few short broad pubescent bracts at its base. *Calyx* ·05 in. long; sessile, campanulate, with 4 small acute teeth, adpressed-hirsute like the tubular corolla; teeth of corolla blunt. *Anthers* 4, linear-oblong, inserted by short filaments in the villous ring in the throat. *Fruit* unknown.

PERAK: at an elevation of 4500 feet; *Wray* 257.

16. *LASIANTHUS KURZII*, Hook. fil. Fl. Br. Ind. III. 183. A shrub? Young branches twice as thick as a crow-quill, densely olivaceous-tomentose like the petioles, stipules, and under surfaces of the midribs and main-nerves of the leaves. *Leaves* thinly coriaceous, oblong, acute at both ends: upper surface dark olivaceous-brown, glabrous, shining, the midrib somewhat depressed (when dry); lower surface dark-olivaceous, pubescent on the distinct horizontal veins and on the 6 or 7 pairs of ascending main-nerves, also on the veins and on the interspaces; length 3·5 to 4·5 in.; breadth ·75 to 1·25 in.; petioles ·15 to ·2 in.; stipules lanceolate with broad bases, shorter than the petioles. *Cymes* sessile, condensed, few-flowered, without the corolla shorter than the petioles, with the corolla longer; bracts oblong, acuminate, few. *Flowers* ·3 in.

long, sessile. *Calyx* sparsely pilose, ovoid, tapering to the small 4-toothed mouth. *Corolla* pilose outside, white, longer than the calyx, salver-shaped, the tube narrowly funnel-shaped; its limb with 4 broad blunt hairy teeth each bearing near its base an oblong anther on a short filament. *Fruit* (*sic* Curtis) blue, .5 in. long.

PENANG: at an elevation of 2000 feet; *Curtis*. SINGAPORE: *Ridley* 140.

We refer this to *L. Kurzii* with some hesitation, for it does not absolutely agree with specimens from the Andamans so named by Sir Joseph Hooker.

17. *LASIANTHUS SUB-INEQUALIS*, King & Gamble, n. sp. A shrub 3 to 5 feet high: young branches rather thicker than a crow-quill, densely rusty-tomentose like the short petioles. *Leaves* membranous, oblong-lanceolate, shortly acuminate, very little or not at all narrowed to the rounded sub-cordate, slightly oblique base; both surfaces pale, olivaceous-brown when dry; the upper sparsely pilose, densely so on the midrib; lower surface more or less pilose everywhere, densely so on the prominent midrib and 8 to 10 pairs of spreading curved main-nerves; length 2 to 3.5 in.; breadth .75 to 1 in.; petiole under .1 in.; stipules ovate to elliptic, sometimes tapering to each end, pilose, .35 to .5 in. long. *Glomeruli* few-flowered, axillary, not so long as the stipules, their bracts like the stipules but smaller. *Flowers* few, about .3 in. long, sessile. *Calyx* deeply divided into 4 unequal lanceolate lobes. *Corolla* about .15 in. long, divided into 4 short lobes, hairy outside like the calyx, concave and glabrous inside. *Anthers* 4, oblong, sessile. *Fruit* .35 in. long, of which half is formed by the persistent calyx-lobes, globular, blue, sparsely hirsute; pyrenes 4, three-sided, smooth.

PERAK: *King's Collector* 157, 3358; *Wray* 2588, 3451; *Ridley* 9715; *Scortechini* 189.—DISTRIB. Sumatra: *Forbes* 2457: Java; on Mounts Salak and Pangerango.

Allied closely to *Lasianthus inaequalis* Bl.; King & Gamble, but with narrower subsessile leaves and much more conspicuous stipules, which are ovate or elliptic not linear.

18. *LASIANTHUS CORONATUS*, King & Gamble, n. sp. Young branches rather thicker than a crow-quill, covered like the petioles, stipules and lower surfaces of the leaf-midribs and main-nerves with soft brown tomentum. *Leaves* coriaceous, oblong-lanceolate, much acuminate, the base cuneate; both surfaces pale-brown when dry; the upper quite glabrous, except the tomentose lower fourth of the midrib, finely reticulate, the midrib and main-nerves depressed; lower surface darker than the upper, the reticulating veins transverse, bold and pubescent, the enclosed spaces almost glabrous; main-nerves 5 or 6 pairs, bold,

spreading, tomentose; length 3 to 3.5 in.; breadth .75 to 1 in.; petioles about .1 in.; stipules linear, twice as long as the petioles. *Cymes* longer than the petioles, few-flowered, bearing a few linear tomentose bracts as long as the stipules and resembling them. *Calyx & corolla* unknown. *Fruit* sub-globular, somewhat narrowed at the base, the apex truncate, the sides deeply 5-grooved, the interspaces pubescent and rugulose, about .25 in. long, crowned by the equally long or longer erect linear pubescent calyx-lobes; pyrenes 5, bony.

PERAK: *Scortechini* 329.

A plant known only from *Scortichini's* imperfect specimens; named from the long conspicuous calyx-lobes on the apex of the fruit.

19. *LASIANTHUS APPRESSUS*, Hook. fil. Fl. Br. Ind. III. 181. A shrub; young branches thinner than a goose-quill, softly and densely hirsute like the petioles, stipules and bracts. *Leaves* sub-coriaceous, oblong-lanceolate, shortly acuminate, the base cuneate (often rather abruptly so); upper surface pale olivaceous-brown, glabrous, shining, the main-nerves and midrib depressed, the latter with 1 or 2 lines of adpressed hairs; lower surface paler and bearing many sub-adpressed yellowish hairs; especially on the main-nerves and rather prominent transverse veins; main-nerves 6 or 7 pairs, curved, ascending, bold and prominent on the lower surface; length 2 to 3 in.; breadth .5 to .75 in.; petiole .1 to .15 in. long; stipules oblong, blunt, adpressed to the stem, rather shorter than the outer flower-bracts. *Flowers* about .15 in. long, sessile, sub-solitary, surrounded by linear-lanceolate, acuminate, hirsute bracts, the outer of which are .25 in. long, the inner being smaller. *Calyx* campanulate, sparsely pilose, the limb with 4 short triangular rather blunt teeth. *Corolla* minute. *Fruit* depressed-globular, crowned by the short calyx-lobes, .15 in. in diam., sparsely pilose; pyrenes 8, three-sided, smooth. *Lasianthus*, Wall. Cat. 8443 and 8442 partly.

MALACCA (on Mount Ophir) *Griffith* (K.D.) 2927. PENANG: *Wallich; King; Deschamps*. JOHORE: *Ridley* 2925, 11183 and 4. PERAK: *Scortechini*.

20. *LASIANTHUS ATTENUATUS*, Jack in Trans. Linn. Soc. XIV. 126. A shrub; young branches not much thicker than a crow-quill, covered like the petioles, and upper surfaces of the leaf-midribs with dense short cinereous-olivaceous tomentum. *Leaves* membranous, oblong, lanceolate, shortly acuminate, the base rounded and somewhat oblique upper surface (except the midrib) glabrous, dark-olivaceous; the lower paler, minutely pilose, especially on the midrib and 7 or 8 pairs of spreading ascending rather bold main-nerves; the reticulations faint; length 2 to 3.5 in.; breadth .75 to 1 in.; petioles about .1 in.; stipules

lanceolate, closely adpressed to the stem, as long as the flower-bracts and hirsute like them. *Flower-bracts* lanceolate or oblanceolate, tapering to each end, .25 to .3 in. long. *Flowers* 1 to 3, sessile. *Calyx* .2 in. long, cleft to the base into 4 lanceolate acuminate hirsute lobes. *Corolla* shorter than the calyx, narrowly campanulate, with 4 short lobes, densely hirsute outside, but glabrous within. *Anthers* 4, oblong, sessile. *Fruit* (fide Jack) "ovoid, hairy, dark-blue, pyrenes 4." Wight in Calc. Journ. Nat. Hist. VI. 504; Hook. fil. Fl. Br. Ind. III. 181. *Mephitidia attenuata*, DC. Prod. IV. 452.

MALACCA: Griffith (K.D.) 2926. PERAK: King's Collector 237, SINGAPORE: Ridley 6517, 6830, 9224.

Allied to *L. appressus*, Hook. fil., but with different pubescence and bracts and rather more nerves in the leaves.

21. *LASIANTHUS DENSIFOLIUS*, Miq. Fl. Ind. Bat. II. 321. A shrub; all parts more or less clothed with coarse flexuose pale-olivaceous hairs with bulbous bases. Young branches slightly thicker than a crow-quill. *Leaves* membranous, nearly sessile, narrowly oblong-lanceolate, somewhat oblique and emarginate, but not narrowed at the base, the apex shortly acuminate; both surfaces olivaceous-brown when dry; main-nerves 8 to 10 pairs, ascending, slightly curved, thin but prominent on the lower surface, faint on the upper; length 1.75 to 2.75 in.; breadth .6 to .8 in.; petioles under .1 in.; stipules lanceolate, densely hirsute, .25 to .3 in. long. *Cymes* axillary, sessile, few-flowered, rather more than twice as long as the petioles; bracts linear, hispid. *Flowers* few, sessile. *Calyx* .2 in. long, with 4 or 5 deep very unequal, lanceolate hispid lobes. *Corolla* much smaller than the calyx with oblong and less hairy lobes. *Anthers* 5, sessile, oblong, opposite the lobes. *Fruit* blue, sub-globular, sparsely hispid, surmounted by the calyx-lobes, .2 or .25 in. in diam.; pyrenes 4. Hook. fil. Fl. Br. Ind. III. 182. *Lasianthus*? Wall. Cat. 8441 in part.

This is very closely allied to the Indian species *L. Wallichii*, Wight.

MALACCA: Maingay (K.D.) 868. JOHORE: King. SINGAPORE: Wallich; Anderson 88; Morton 142; Ridley 4898, 5679. SELANGOR: Ridley 7421.

VAR. *latifolia*, King. *Leaves* broadly oblong with a short broad abrupt acumen, the base broad, oblique, sub-cordate, and more than 1 in. broad; young branches and inflorescence densely covered with coarse hair, 2.25 in. long.

JOHORE: Ridley 10948. SELANGOR: Ridley 7423.

VAR. *calycina*, King. *Leaves* glabrous on the upper surface except 196

for a very few scattered adpressed hairs and for the strigose midrib; main-nerves not more than 8 pairs; fruit crowned by calyx-lobes as long as itself.

SINGAPORE: *Ridley* 5679.

22. *LASIANTHUS ROBUSTUS*, King & Gamble, n. sp. Young branches terete, sub-glabrous, about as thick as a goose-quill. *Leaves* large, coriaceous, pale-olivaceous on both surfaces (when dry) and glabrous, oblanceolate, much narrowed but not acute at the base; upper surface corrugated from the depression of the nerves and veins, the midrib thin but prominent; under surface with bold large reticulations and stout midrib, the 16 to 20 pairs of curved ascending main-nerves thin but prominent length 8 to 12 in.; breadth 2.5 to 3.25 in.; petioles .4 in., stout, channelled; stipules coriaceous, sagittate, pale, about .4 in. long (measured to the end of the basal lobes). *Cymes* shorter than the petioles, condensed, ebracteate, few-flowered. *Calyx* shortly campanulate, glabrous, about .1 in. long, the mouth with 5 or 6 obscure teeth. *Corolla* unknown. *Fruit* sub-globular, 6-ridged, glabrous, crowned by the short calyx-tube, .15 in. in diam., pyrenes 5 or 6.

MALACCA: (at Ayar Pannas) *Ridley* (without number).

Only a single specimen seen by me, and that a poor one.

23. *LASIANTHUS CORIACEUS*, King & Gamble, n. sp. A small foetid shrub; young branches terete or somewhat compressed, minutely puberulous, the bark thick, pale and rugulose when dry. *Leaves* very coriaceous, oblong-elliptic, gradually and bluntly acuminate, the base cuneate; upper surface pale-brown when dry, everywhere glabrous, shining, the stout midrib and the main-nerves depressed; lower surface pale cinereous-brown, glabrous, dull; the midrib very stout and prominent; main-nerves 10 to 12 pairs, spreading but also ascending, ultimately glabrous, but like the midrib at first minutely adpressed, puberulous; intermediate nerves none, reticulations wide and indistinct; length 7 to 11 in.; breadth 2.5 to 3.5 in.; petiole about .4 in. stout, channelled; stipules triangular acuminate, half as long as the petioles. *Cymes* axillary, rather longer than the petioles, on short peduncles, ebracteate, bearing 3 to 5 sessile flowers. *Calyx* .15 in. long, widely tubular, truncate. *Corolla* unknown. *Fruit* (fide *Scortechini*) deep purple, .25 in. in diam., minutely hairy, crowned by the truncate, entire or faintly 4-toothed calyx-limb; pyrenes 4.

PERAK: *Scortechini* 332. SELANGOR: *Ridley* 10217, 8540 in part.

This is very like *L. pergamaceus* K. & G., which however is a tree with very thick leaves indistinctly veined.

24. *LASIANTHUS PERGAMACEUS*, King & Gamble, n. sp. A tree; young

branches, under surfaces of leaves, and outside of calyx and corolla minutely but deciduously puberulous; all other parts except the corolla quite glabrous. *Leaves* thinly coriaceous, oblong-elliptic, shortly and rather bluntly acuminate, the base cuneate; both surfaces pale hepatic-brown when dry and reticulate, the upper in all stages quite glabrous, the lower ultimately becoming so; the midrib very bold on the lower, less so in the upper surface; main-nerves 10 pairs, thin but distinct, spreading and ascending, many of the intermediate nerves prominent and spreading like the main ones, the reticulating veins delicate and forming square or rhomboidal areolae; length 8 to 10 in.; breadth 2 to 2.75 in.; petiole .3 to .4 in.; stipules .15 in. long with broad bases and abrupt oblong points. *Cymes* not much exceeding the petioles, ebracteate, 4- or 5-flowered, shortly pedunculate. *Flowers* .5 in. long, sessile. *Calyx* .25 in. long, tubular, the mouth truncate but obscurely toothed. *Corolla* much longer than the calyx, tubular, sub-inflated below the broadly 4-toothed limb, thick (almost fleshy), coarsely pubescent on one side externally, more or less villous everywhere internally. *Anthers* 4, narrowly oblong, on short thick filaments. *Fruit* unknown.

PERAK: at an elevation of 4500 feet on Gunong Batu Pateh, Wray 270.

Mr. Wray describes the whole plant as very foetid when bruised.

25. *LASIANTHUS MALACCENSIS*, King & Gamble, n. sp. A small tree; young branches twice as thick as a crow-quill, terete, puberulous, very dark in colour when dry. *Leaves* coriaceous, oblong-lanceolate, bluntly acuminate, the base rounded but slightly contracted just above its junction with the petiole; the edges somewhat wavy; both surfaces glabrous except for a few minute adpressed hairs on the midrib and nerves, dark olivaceous-brown, reticulate when dry; main-nerves 8 or 9 pairs, curved, ascending abruptly, thin and inconspicuous; length 4 to 5 in.; breadth 1 to 1.4 in.; petiole .3 in. *Stipules* much shorter than the petioles, the base broad, abruptly narrowed into the triangular apex. *Flowers* two or three together in the leaf-axils. *Calyx* sessile, campanulate, tapering to the base, less than .1 in. long, puberulous outside the mouth, wide and minutely 5-toothed. *Fruit* sub-globular, pulpy, surmounted by the 5 or 6 blunt short calyx-teeth, .2 in. in diam.; pyrenes 4, narrow, smooth.

MALACCA: Ridley 3219.

26. *LASIANTHUS CHINENSIS*, Benth. Fl. Hongkong 160. A shrub 8 to 12 feet high; young branches rather thinner than a goose-quill, angled, the bark dark-brown when dry, sparsely and minutely adpressed-pubescent. *Leaves* dark olivaceous-brown when dry, thinly coriaceous, elliptic-

oblong, shortly acuminate, narrowed to the base; surface reticulate, glabrous, except for a few adpressed hairs near the base, and on the midrib and longer nerves; main-nerves 8 or 9 pairs, thin, prominent on the lower surface, slightly curved, ascending; length 5 to 6.5 in., breadth 1.5 to 2 in.; petiole stout, adpressed rusty-pubescent, about .15 in. long; stipules triangular, shorter than the petioles. *Cyme*, ebracteate, axillary, few-flowered, sessile, about twice as long as the petioles. *Flowers* .4 in. long, on pedicels much shorter than themselves. *Calyx* adpressed-pubescent, campanulate, deeply divided into 4 or 5 somewhat spreading, lanceolate, acuminate lobes. *Corolla* glabrous outside, longer than the calyx, salver-shaped; the tube densely pilose inside; the lobes oblong, thickened at their apices, reflexed. *Filaments* about as long as the 5 or 6 linear anthers. *Fruit* unknown. Hook. fil. Fl. Br. Ind. III. 187.

PERAK: *King's Collector* 2582, 10100.

The collector, in his field-note, describes the corolla as white and the calyx as blue.

27. *LASIANTHUS WIGHTIANUS*, Hook. fil. Fl. Br. Ind. III. 188. A shrub? Young branches compressed, varying in thickness, some as thick as a goose-quill, all as well as the petioles, the backs of the stipules, the under-surfaces of the main-nerves, and both sides of the midrib of the leaves minutely rusty adpressed-pubescent. *Leaves* dark-brown when dry, elliptic-oblong, the apex shortly acuminate, the base rounded, rarely sub-acute; upper-surface finely reticulate, the veins and nerves sparsely strigose; under-surface strongly reticulate, the veins and nerves pubescent; main-nerves 10 to 13 pairs, very prominent, curved, spreading; length 3.5 to 4.25 in.; breadth 1.25 to 1.5 in., petioles .1 to .15 in.; stipules triangular, acuminate, as long as the petioles. *Cymes* slightly longer than the petioles, few-flowered, ebracteate. *Flowers* clustered, sub-sessile. *Calyx* pubescent, .1 in. long, narrowly campanulate, with 5 small triangular spreading teeth. *Corolla* and *fruit* unknown. *Mephitidea venosa*, Wight in Calc. Journ. Nat. Hist. VI. 514, not of Blume.

MALACCA: on Mount Ophir, *Griffith* (K.D.) 2922.

28. *LASIANTHUS PTEROSPERMUS*, Wight in Calc. Journ. Nat. Hist. VI. 510. A shrub; young branches half as thick as a goose-quill, compressed especially at the nodes, strigose-puberulous, becoming subglabrous. *Leaves* coriaceous, elliptic or oblong-elliptic, shortly and bluntly acuminate or sub-acute, narrowed to the slightly oblique, rarely sub-acute, base; both surfaces when dry reticulate, pale-brown, tinged with olivaceous, the upper glabrous, the lower minutely substrigose,

the midrib and main-nerves depressed on the upper surface (when dry); main-nerves 10 to 12 pairs, spreading, ascending, prominent on the lower surface; length 5 to 7 in.; breadth 1.25 to 2.25 in.; petioles .2 to .25 in.; stipules oblong-lanceolate, blunt, strigose, .35 in. long. *Cymes* only slightly longer than the petioles, 3- to 4-flowered. *Flowers* sessile, with a few minute bracts or without any. *Calyx* sessile, .15 in. long, strigose, the limb with 5 short obtuse triangular teeth. *Corolla*, globose, glabrous. *Drupe* sub-globose, .5 in. in diam. when fresh, only .3 in. when dry, glabrous, black, crowned by the shortly tubular calyx-limb; pyrenes 4 to 5, trigonous, bisulcate on the back and with 3 vertical processes, the middle one thick and rugulose, the two lateral thin and wing-like.

MALACCA: *Griffith* (K.D.) 2929; *Maingay* (K.D.) 866.

29. *LASIANTHUS PERAKENSIS*, King & Gamble, n. sp. A shrub or small tree; young branches half as thick as a goose-quill, deciduously and minutely rusty-puberulous like the petioles, stipules and under surfaces of the midrib and main-nerves. *Leaves* thinly coriaceous, narrowly elliptic or obovate-elliptic, abruptly and shortly acuminate, narrowed in the lower third to the short petiole; upper surface dark-olivaceous, quite glabrous, shining, the midrib and nerves not prominent; under surface paler olivaceous, glabrous except the puberulous midrib and 7 or 8 pairs of prominent ascending, little-curved main-nerves; the veins very bold, transverse; length 6 to 10 in.; breadth 1.75 to 3.25 in, petiole .2 to .25 in.; stipules triangular, acute, shorter than the petioles, adpressed to the stem. *Glomeruli* about as long as the petioles, condensed, ebracteate or with a few small linear hairy bracts shorter than the calyx. *Flowers* sessile, crowded. *Calyx* campanulate, much tapered to the base, the mouth wide and with 5 indistinct blunt, spreading lobes, pubescent. *Corolla* not seen; ovary 5-celled. *Fruit* hemispheric, sub-glabrous, ribbed, crowned by the calyx; pyrenes 5.

PERAK: *King's Collector* 682, 2438, 2838, 10210; *Wray* 4128.

Resembling *L. Maingayi* in leaves but with 5-merous flowers.

30. *LASIANTHUS ANGUSTIFOLIUS*, King & Gamble, n. sp. Small tree; young branches covered with a thin dense layer of adpressed minute pale-brown tomentum. *Leaves* thickly membranous, narrowly oblong-lanceolate, caudate-acuminate, the base cuneate; both surfaces brown when dry; the upper the darker, glabrous except the tomentose midrib; the lower glabrous except the pubescent midrib and nerves; the reticulations transverse strong on the lower surface, faint on the upper; main-nerves 12 to 14 pairs, slightly curved, ascending, thin but distinct on the lower, indistinct on the upper surface; length 5 or 6 in.; breadth

.6 to .75 in.; petiole .15 in.; stipules lanceolate, much shorter than the petioles, their edges ciliate. *Cymes* axillary, 2- to 3-flowered, ebracteate, sessile, shorter than the petioles. *Flowers* about .2 in. long, sessile. *Calyx* adpressed pubescent on both surfaces, tubular-campanulate, with 5 triangular-acuminate, slightly spreading teeth. *Corolla* slightly longer than the calyx, tubular, slightly inflated below the mouth; lobes 5, lanceolate, acuminate, sub-erect; the tube glabrous on both surfaces and the teeth adpressed-pubescent on both. *Anthers* small, narrowly oblong. *Fruit* ovoid-globular, crowned by the spreading calyx-lobes, about .2 in. long; pyrenes 4 or 5, rugulose.

PERAK: on Gunong Batu Pateh at 4500 feet, *Wray* 413.

31. *LASIANTHUS OBLONGUS*, King & Gamble, n. sp. Young branches slightly thicker than a crow-quill, somewhat angled, densely but very minutely adpressed-pubescent. *Leaves* membranous, narrowly oblong-lanceolate, gradually tapering into the caudate-acuminate apex, the base much narrowed; both surfaces dark dull-brown when dry, minutely scaly, puberulous on the nerves and midribs, obscurely transverse-reticulate; main-nerves about 7 pairs, curved upwards, not conspicuous; length 3 to 5 in.; breadth .6 to 1 in.; petiole .15 to .2 in.; adpressed-puberulous. *Stipules* lanceolate-acuminate, about .1 in. long. *Cymes* ebracteate, axillary, sessile, 5- to 7-flowered, twice as long as the petioles. *Flowers* .35 in. long, on very short pedicels, adpressed-puberulous or glabrous. *Calyx* campanulate, shallow, the mouth wide, truncate, entire. *Corolla* more than twice as long as the calyx, salver-shaped; the tube slightly widened near the mouth; the limb densely hirsute on its upper surface, the lobes 5, oblong, obtuse. *Anthers* 5, oblong, sub-acute, on short filaments. *Fruit* depressed-globular, about .2 in. in diam. when dry, glabrous, 7- or 8-ridged, somewhat corrugated, crowned by the small calyx; pyrenes 7 or 8, each with a transverse septum dividing it into two cells, the outer of which is 1-seeded, the inner empty.

PERAK: *Scortechini* 265; *Ridley* 4935, 9702, 9729; *Wray* 2590; *King's Collector* 402, 4128, 4462, 10082; *Curtis* 2018. SELANGOR: *Ridley* 7438.

This closely resembles a specimen in Herb. Kew (Horsfield Rub. 52) doubtfully named *Lasianthus sylvestris* Miq., but in that the calyx has 5 distinct triangular acute teeth.

32. *LASIANTHUS MONTANUS*, King & Gamble, n. sp. A bush 4 to 8 feet high; young branches slightly thicker than a crow-quill, rather minutely adpressed-pilose like the stipules. *Leaves* thickly sub-coriaceous, ovate-lanceolate, shortly acuminate, the base cuneate; both

surfaces olivaceous, somewhat shining, reticulate, the upper quite glabrous, the lower pubescent on the bold midrib and thin but prominent 5 or 6 pairs of curved ascending main-nerves, sometimes also on the transverse veins; length 3 to 4.5 in.; breadth 1 to 1.5 in.; petioles .1 to .15 in., stout, stipules about .15 in. long, pubescent, adpressed to the stem, triangular-acuminate. *Flowers* solitary or in pairs, about .5 in. long, ebracteate. *Calyx* nearly as long as the corolla with a short tube and 5 long unequal linear-lanceolate pubescent lobes. *Corolla* white, salver-shaped; the tube long and narrow, pubescent on both surfaces, but especially inside near the base; lobes broad, spreading, somewhat irregular, with tufts of long hair near their apices. *Anthers* 5, short, subsessile near the base of the tube. *Fruit* unknown.

PERAK: at elevations of 3000 to 4000 feet, *Wray* 3932; *King's Collector* 2156.

33. *LASIANTHUS CURTISII*, King & Gamble, n. sp. A shrub; young branches somewhat thicker than a crow-quill, sparsely and deciduously pubescent, ultimately glabrous. *Leaves* thickly membranous, olivaceous-brown when dry, lanceolate or elliptic-lanceolate, much acuminate, the base slightly cuneate; upper surface quite glabrous; lower minutely and softly pubescent on the midrib, bold transverse veins and 4 to 6 pairs of stout spreading ascending curved main-nerves; length 2.5 to 3.5 in.; breadth .35 to 1.25 in.; petioles .15 to .2 in., very pubescent; stipules triangular, adpressed to the stem, hirsute, under .1 in. long. *Cymes* not much longer than the petioles, axillary, sessile, 6- to 8-flowered, ebracteate. *Flowers* sessile, .15 to .2 in. long. *Calyx* cleft to nearly the base into 5 sub-equal, linear-lanceolate sub-erect lobes, hirsute externally. *Corolla* much shorter than the calyx, its upper part with dense long yellow hair; lobes 5, short, blunt. *Anthers* 5, sessile, oblong, blunt. *Fruit* ovoid-globular, sparsely pilose, .1 in. long but crowned by the equally long, persistent calyx-lobes; pyrenes 5, broad, 3-angled.

PENANG: *Curtis* 284, 9355.

34. *LASIANTHUS PSEUDO-LUCIDUS*, King, n. sp. A bush; young branches slender, densely and minutely tawny-tomentose. *Leaves* thinly coriaceous, narrowly elliptic-lanceolate, acuminate, the base cuneate, both surfaces pale olivaceous-brown when dry, the upper glabrous; the lower darker, reticulate, puberulous on the midrib and nerves; main-nerves 6 or 7 pairs curved, ascending, distinct on the lower surface; length 2 to 2.5 in.; breadth .6 to .75 in.; petiole about .1 in., pubescent; stipules narrowly oblong-lanceolate, tomentose, .4 in. long. *Cymes* twice as long as the petioles, on short tomentose peduncles, 3- to 4-flowered. *Flowers* sessile. *Calyx* campanulate, .25 in. long, deeply

divided into 5 slightly unequal, linear-lanceolate lobes, hirsute on both surfaces. *Corolla* and fruit not seen.

PERAK: at 5000 feet, *Wray* 4109.

A species near *L. lucidus*, Blume (not of Hook. fl. in Fl. Br. Ind.), but differing from that species in its thicker, less acuminate and rather fewer-nerved leaves, and thicker twigs which are moreover tomentose instead of glabrous. The calyx of this is moreover hirsute instead of glabrous.

35. *LASIANTHUS NERVOSUS*, King & Gamble, n. sp. A small dense shrub 2 to 3 feet high; young branches and petioles covered with dense short olivaceous tomentum. *Leaves* coriaceous, deep olivaceous-brown when dry, shining and minutely reticulate, oblong-lanceolate, the apex acute or sub-acute and mucronate, the base sub-cuneate; upper surface glabrous, the midrib depressed; lower slightly paler, the stout midrib and 6 to 8 pairs of prominent curved ascending nerves minutely adpressed-pubescent; length 1 to 1.5 in.; breadth .4 to .6 in.; petioles .1 to .15 in. long; stipules triangular, much shorter than the petioles, pubescent, caducous. *Cymes* sessile, while in flower shorter than the petioles, 3-flowered. *Flowers* sessile, about .15 in. long. *Calyx* cupular, very short, with 4 triangular teeth. *Corolla* longer than the calyx (about .1 in. long), the tube cylindric, hairy, white; the lobes 4, short, with moniliform hairs inside. *Anthers* attached to the middle of the tube. *Style* shortly bifid. *Berry* bluish, sparsely hairy, globular, .15 in. in diam., crowned by the calyx-teeth; pyrenes 4.

PERAK: *Scortechini* 342.

36. *LASIANTHUS HARVEYANUS*, King & Gamble, n. sp. A shrub; young branches rather thicker than a crow-quill, minutely rusty-tomentose like the petioles and midribs of the leaves on both surfaces. *Leaves* membranous, elliptic or ovate-elliptic, (oblong-elliptic in var.); narrowed to the rather blunt (acuminate in var.) apex, the base rounded; both surfaces pale-brown when dry; the upper scaberulous and with a few scattered adpressed hairs near the edges; lower surface scabrid-puberulous between the 4- to 6 (8 to 10 in var.) pairs of slender little-curved ascending minutely pubescent main-nerves; length 4 to 5 in. (up to 7.5 in var.) breadth 1.65 to 2 in.; petioles .15 to .2 in.; stipules triangular, acute, one-third or one-half as long as the petioles. *Cymes* longer than the petioles, ebracteate, 3- to 5-flowered. *Flowers* .3 in. long, sessile. *Calyx* under .1 in. in length, narrowly campanulate, densely pubescent, the mouth 4-toothed. *Corolla* both outside and inside less pubescent than the calyx, funnel-shaped; the mouth with 4 ovate and acute spreading lobes. *Anthers* 4, narrowly oblong, shortly apiculate, exerted, attached by short filaments to the densely villous throat; style elongate; stigmas 2 or 3, hairy. *Fruit* unknown.

PERAK: at an elevation of 3400 feet, *Wray* 444.

VAR. *longifolia*. Leaves elliptic-oblong, shortly acuminate, as much as 7.5 in. long, with 8 to 10 pairs of nerves.

MALACCA: *Harvey*.

37. *LASIANTHUS FERRUGINEUS*, King & Gamble, n. sp. A bush; young branches about half as thick as a goose-quill, rusty-lanate like the outside of the stipules, the petioles and both sides of the leaf-midribs. Leaves dark-brown when dry, thinly coriaceous, oblong-lanceolate, much acuminate, the base rounded or sub-cuneate; upper surface reticulate, sparsely covered with stiff flexuose hairs with conspicuous black bulbs at their bases, shining, the nerves thin but distinct; lower surface more densely hairy (the hairs with smaller bulbs), especially dense on the 16 to 18 pairs of bold curved spreading main-nerves; length 5 or 6 in.; breadth 1.25 to 1.5 in.; petioles .15 to .2 in.; stipules triangular, sub-acute, longer than the petioles, deciduous. Cymes small, not so long as the petioles, few-flowered, ebracteate. Flowers on short hirsute pedicels. Calyx .25 in. long, tubular-campanulate, densely hirsute like the corolla, deeply divided into 5 lanceolate acuminate sub-equal lobes. Corolla like the calyx but only half as long, white. Disk smooth, glabrous, orbicular. Style short, glabrous. Fruit unknown.

PERAK: at an elevation of 4500 feet; *Wray* 3911.

38. *LASIANTHUS TOMENTOSUS*, Blume Bijdr. 997. A shrub? Young branches varying in thickness, the longer nearly as thick as a goose-quill, densely clothed like the petioles and stipules with dense short rusty tomentum. Leaves thickly membranous, oblong-lanceolate, acuminate, the base cuneate or rounded; upper surface blackish-olivaceous when dry, sparsely and minutely strigose; the lower paler, shortly olivaceous-pilose except the 7 to 10 pairs of curved ascending nerves on their lower surfaces, and the bold midrib on both, which are tomentose; length 2.5 to 3.5 in.; breadth .5 to 1 in.; petiole .1 to .2 in.; stipules about as long as the petioles, triangular. Cymes when in flower twice as long as the petioles, when not in flower shorter, condensed, few-flowered, ebracteate, sessile. Flowers .2 in. long, sessile. Calyx under .1 in. long, widely campanulate, hirsute, the mouth sub-truncate, obscurely toothed. Corolla salver-shaped; the tube wide, glabrous outside and inside but with a band of stout hairs at the throat; lobes of the limb ovate, sub-acute, sub-erect, sparsely hirsute. Anthers 5, ovate-oblong, on short filaments, curving inward, and cohering by their margins and tips. Style as long as the tube of the corolla, cylindric, divided into 2 compressed arms. Ovary 5-celled, with a single ovule in each.

PERAK: *Yapp* 525. JOHORE: *Ridley* 11181, 11182, 4083.

This resembles No. 17, but has its leaves hairy on the upper surface, thicker young branches and a much wider corolla-tube.

39. *LASIANTHUS SCALARIFORMIS*, King & Gamble, n. sp. A shrub 5 or 6 feet high; young branches thinner than a goose-quill, minutely rusty-puberulous, faintly ridged, dark-coloured when dry. *Leaves* coriaceous, narrowly elliptic-oblong, the apex very shortly acuminate or acute, much narrowed to the base; both surfaces dark olivaceous-brown when dry, glabrous, shining, the veins scalariform, horizontal, close together, very distinct especially on the lower surface, the midrib thin on the upper surface, stout, convex and often faintly puberulous on the lower surface; main-nerves 7 or 8 pairs, little curved, ascending, broad, bold, and when young, minutely puberulous on the lower surface, always faint and glabrous on the upper; length 4 to 5 in.; breadth 1.25 to 1.5 in.; petioles .25 to .3 in.; stipules minute (about .05 in. long) triangular, with broad bases. *Peduncle* solitary, ebracteate, glabrous, about .5 in. long, bearing at its apex a 3- to 5-flowered cyme. *Flowers* sessile. *Calyx* .2 in. long, campanulate, deeply divided into 5 narrowly oblong acute lobes very minutely puberulous. *Corolla* not seen. *Fruit* glabrous, obovoid, 5-ridged; pyrenes 5.

PERAK: *Scortechini* 411; *Wray*, at an elevation of 6700 feet, 332.

40. *LASIANTHUS FILIFORMIS*, King & Gamble, n. sp. A slender shrub 2 to 4 feet high; young branches rather thicker than a crow-quill, clothed like the other parts of the plant with long spreading rather slender hairs. *Leaves* membranous, subsessile, oblong-lanceolate, shortly acuminate; the base rounded, slightly unequal and minutely caudate, both surfaces olivaceous-brown when dry (sometimes pale), dull, more or less hispidulous-pubescent especially on the midrib and main-nerves; the upper when old sometimes almost glabrous; main-nerves 7 to 9 pairs, thin, but pale and rather conspicuous on the lower surface (when dry), inconspicuous on the upper; length 2 to 2.75 in.; breadth .65 to 1 in.; petiole under .1 in. or almost absent; stipules linear-lanceolate, pubescent, .2 or .25 in. long. *Inflorescence* a slender solitary filiform, sparsely pubescent peduncle .75 to 1 in. long, bearing at its apex one or at most two, flowers subtended by a single or double linear bracteole (by two large leaf-like bracts in var. *bracteata*). *Calyx* with a campanulate tube .1 in. long, and 4 linear-lanceolate erect lobes longer than itself. *Corolla* tubular, exceeding the calyx-lobes, white hairy, deeply 4-lobed. *Ovary* 8-celled. *Fruit* baccate, blue, .25 in. in diam., crowned by the long persistent calyx-lobes.

PERAK: *Scortechini* 29; *King's Collector* 851.

VAR. *bracteata*. Flowers subtended by two ovate acute leaf-like bracts from .3 to .5 in. long.

PERAK: *Scortechini* 180, 190; *Ridley* 8578.

41. *LASIANTHUS GRACILIS*, King & Gamble, n. sp. A slender shrub 2 to 3 feet high, young branches as thick as or thinner than a crow-quill, like the petioles and sometimes the under-surfaces of the midribs densely adpressed-pubescent. *Leaves* stiffly membranous, ovate or sub-rhomboidal, the apex acute and minutely apiculate; the base cuneate, sometimes slightly unequal; both surfaces usually glabrous; the 7 to 9 pairs of main-nerves spreading, little curved, pale and conspicuous beneath; length .6 to .75 in.; breadth .35 to .5 in.; petiole under .1 in.; stipules as long as the petioles, caducous. *Inflorescence* a filiform hairy peduncle shorter than the leaves, bearing at its apex 1 or 2 minute bracteoles and (*fide* *Scortechini*) 1 to 3 flowers. *Fruit* depressed-globular, glabrous, shining, .15 in. in diam. with 4 vertical ridges; pyrenes 4.

PERAK: *Scortechini* 39, 617. *Ridley* (in tea gardens) 2904.

42. *LASIANTHUS MAINGAYI*, Hook. fil. Fl. Br. Ind. III. 188. A large shrub or small tree; young branches much thinner than a goose-quill, somewhat compressed, covered with deciduous minute rather stiff rusty hairs or sub-glabrous. *Leaves* thickly membranous, large, sub-coriaceous, pale-brown, often tinged with olivaceous when dry, narrowly elliptic or sub-obovate-elliptic, shortly and abruptly acuminate; upper surface quite glabrous, shining, the midrib and main-nerves and also the reticulations rather prominent when dry; lower surface rather rough from the bold pale transverse veins; main-nerves 5 or 6 pairs, slightly curved, ascending, thin but prominent; the midrib stout, glabrous or with a few minute hairs; length 5.5 to 8.5 in.; breadth 1.75 to 3 in.; petiole .2 to .3 in.; stipules, lanceolate, acuminate, the base broad, shorter than the petioles, pubescent, deciduous. *Glomeruli* lobulate, shorter than the petioles, sessile ebracteate, the flowers crowded on 2 or 3 short thick branches. *Flowers* about .15 in. long, on very short pedicels, puberulous. *Calyx* about as long as the corolla, campanulate, constricted somewhat below the three blunt or acute triangular teeth. *Corolla* tubular with 3 sub-acute triangular teeth. *Anthers* 3, broadly oblong, emarginate at the apex. *Ovary* 3-celled, style cylindric. *Fruit* obliquely elliptic, crowned by the small calyx; pyrenes 3, rugulose.

MALACCA: *Maingay* (K.D.) 871. SINGAPORE: *Ridley* 10737; *King* 89; *Hullett* 528. JOHORE: *Ridley* 6516, 11185, 11186, 11187. SELANGOR: *Ridley* 4895. PERAK: *Scortechini*, 678; *King's Collector* 2964.

This resembles No. 13, but is trimerous, its cymes have thick branches and are ebracteate, and its young stems and leaves are glabrous or nearly so.

ianus / 43. *LASIANTHUS TUCIDUS*, King & Gamble, n. sp. A glabrous foetid shrub; young branches rather thicker than a crow-quill, somewhat compressed, especially at the nodes. *Leaves* thinly coriaceous, oblong-

elliptic or lanceolate, the apex caudate-acuminate, the base much narrowed, both surfaces pale-brown when dry, shining, reticulate; main-nerves 7 to 10 pairs, thin, spreading, interarching .15 in. from the edges, the secondary nerves almost as prominent; length 3.5 to 6 in.; breadth 1.15 to 1.8 in.; petiole .15 to .2 in. or .25 in., slender; stipules minute triangular, much shorter than the petioles. *Cymes* sessile, 4- to 8-flowered, ebracteate. *Flowers* .25 in. long, on short pedicels, narrow, erect. *Ovary* tubular, with 3 broad teeth much shorter than the corolla, glabrous. *Corolla* narrowly tubular, with 3 long narrow-ovate lobes, hairy inside except at the tip. *Anthers* 3, erect, narrowly oblong, not quite so long as their filaments. *Ovary* 3-celled; style long, slender, clavate. *Fruit* sub-trigonal, or sub-didymous, depressed, .2 to .35 in. in diam., shining, blue; pyrenes 2 or 3, oblique sub-pyriform, smooth, each divided into 2 cells by a transverse septum, the anterior cell empty. *Seeds* concave, cupped, fleshy.

PERAK: *Scortechini* 264, 463; *King's Collector* 788, 2797, 2840, 5051; *Ridley* 2928, 5549, 7437, 8574; *Wray* 426, 973, 2807, 3931.

52. CHASALIA, Commers.

Characters of *Psychotria* except that the corolla-tube is slender and in one species is usually curved, and the seeds are orbicular plano-concave, the dorsal surface being flat and the anterior deeply concave; almost cupped, albumen uniform.—DISTRIB. About 10 species, tropical Asiatic and African.

In our opinion this genus might with advantage be reduced to *Psychotria*.

Flowers sessile, from .5 to 1 in. long; corolla-tube slender,

curved ... 1. *C. curviflora*.

Flowers pedicelled, .15 in. long; corolla-tube wide, straight 2. *C. rostrata*.

1. CHASALIA CURVIFLORA, Thwaites Enum. Pl. Ceyl. 150, 421. A shrub 2 to 4 feet high; everywhere glabrous. Young branches woody, terete, glabrous, dark-coloured when dry. *Leaves* membranous, elliptic, oblong-elliptic, oblong or oblanceolate, shortly and somewhat abruptly and often bluntly acuminate, narrowed at the base; (narrowly elliptic or linear in vars.) upper surface olivaceous-brown when dry, the lower paler; main-nerves 5 or 6 pairs, much curved, spreading and ascending, thin but distinct on the lower surface like the wide reticulations; length 6 to 8 in.; breadth 1 to 2.75 in.; petioles .3 to .75 in. *Stipules* coriaceous, campanulate-cupular, blunt, .15 to .35 in. deep, the upper edge truncate, entire or 2- or 3-cleft. *Cymes* solitary, terminal, from 1 to 2 in. long, and the same in diam., sometimes on naked peduncles .5 to 1.25 in. or even more in length; branches divergent,

trichotomous, often short, few-flowered. *Flowers* sessile, from .5 to 1 in. long. *Calyx* only .15 in. long, campanulate, the mouth irregularly and shortly toothed. *Corolla* about four times as long as the calyx, the tube long and narrow; its 4 lobes not a quarter of its length, lanceolate, spreading. *Anthers* 4, linear-oblong, deeply cordate at the base, the filaments varying in length. *Style* also varying in length. *Fruit* pisiform, globose sometimes didymous, crowned by the small remains of the calyx, glabrous, pyrenes thin, each with one plano-convex seed. Kurz For. Flora Burma, II. 14; Miq. in Ann. Mus. Lugd. Bat. IV. 202; Hook fl. Fl. Br. Ind. III. 176; Trimen Flora Ceylon III. 363. *C. lurida*, *C. tetrandra*, Miq. Fl. Ind. Bat. 281, 282. *C. Sangiana*, Miq. Fl. Ind. Bat. Suppl. 546. *Psychotria lurida*, Bl. Bijdr. 959; DC. Prod. IV. 521. *P. currifolia* and *P. ophioxylodes*, Wall. in Roxb. Fl. Ind. ed. Carey & Wall. II. 167, 168; Cat. 8360, 8364; DC. Prod. l.c. 520. *P. ambigua*, W. & A. Prod. 433; Wt. Ic. t. 127. *P. tetrandra*, BC. Bijdr. 961; DC. l.c. 521. *Zwaardekronia lurida*, Korth, in Ned. Kruidk. Arch. II. 252. *Ixora attenuata*, Wall. Cat. 6164. *Psychotria*, Wall. Cat. 8361, 8362, 8363, 8364, 8375; (in part) 8386, 8390. *Rubiaceae*, Wall. Cat. 8461.

In all the provinces, common.

The corolla varies in length and is moreover dimorphous as regards the respective length of the stamens and pistils. As regards leaves the plant varies greatly. It seems necessary, however, to separate one Malayan variety.

VAR. linearis King & Gamble; leaves linear-oblong from 3.25 to 8.5 in. long, and from .35 to .65 in. in breadth.

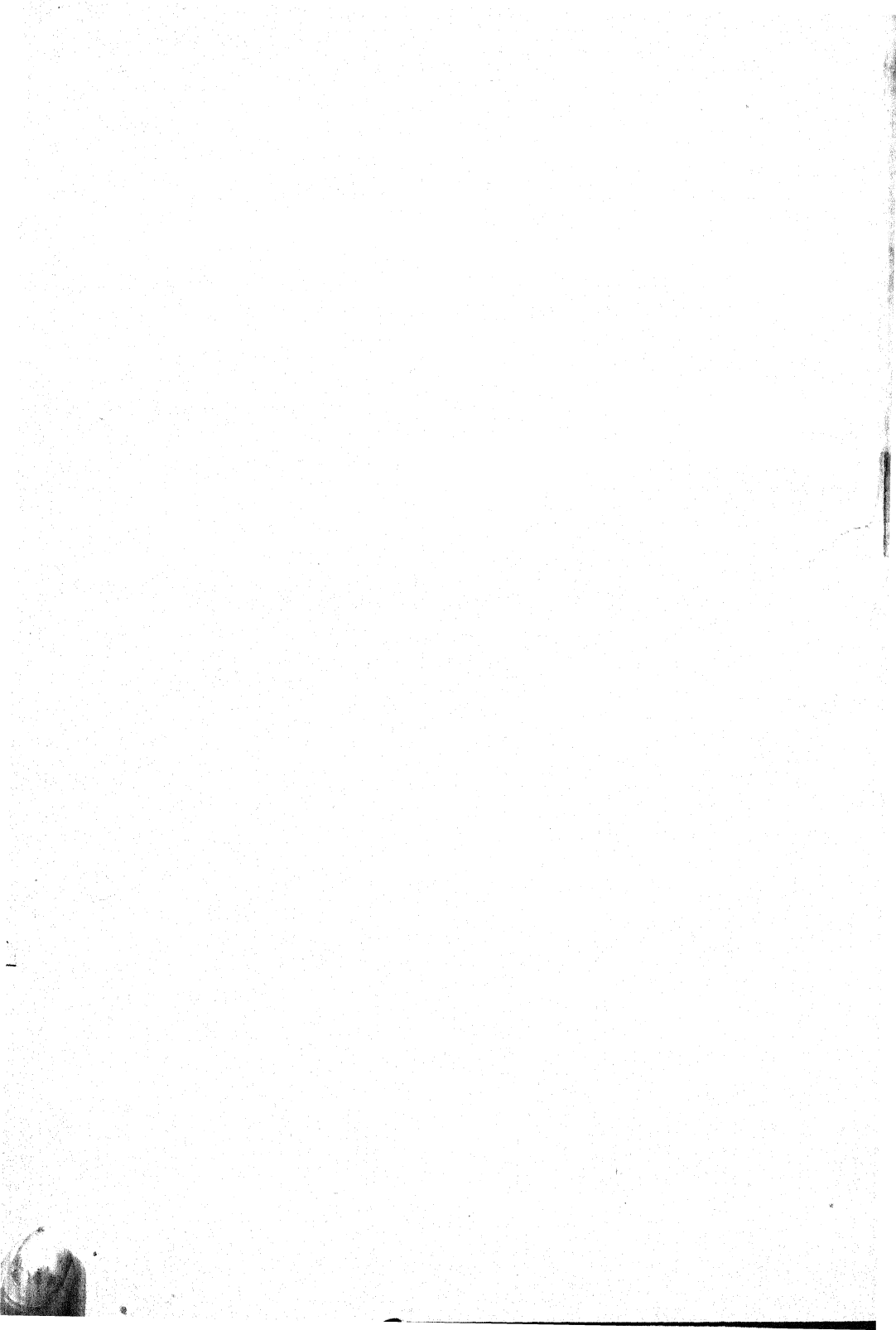
MALACCA: Ridley 1359; Goodenough 1606.

2. **CHASALIA ROSTRATA**, Miq. in Ann. Mus. Lugd. Bat. IV. 203 excl. syn. *Psychotria tetrandra*. A slender glabrous shrub; young branches thicker than a crow-quill, compressed, pale. *Leaves* membranous, greenish when dry, elliptic or elliptic-oblong, the apex acuminate, the base usually much narrowed but sometimes rounded and oblique; both surfaces more or less distinctly fine-reticulate; main-nerves 5 or 6 pairs, curved, spreading, conspicuous beneath when dry; length 3 to 6 in.; breadth 1.5 to 2 in.; petiole .25 to .4 in.; stipules less than .1 in. long, connate into a short tube, the mouth with a few bristles. *Cymes* solitary, terminal, slender, from .75 to 2 in. long (including the peduncle); bracteoles few, broad, coriaceous; branches divergent, trichotomous, few-flowered. *Flowers* .15 in. long, on short pedicels. *Calyx* campanulate; the mouth oblique, irregularly 4- or 5-toothed. *Corolla*-tube wide, only slightly longer than the calyx; the limb about as long as the tube with 4 broad blunt spreading lobes. *Anthers* 3 or 4, ovate, as long as the filaments, included in the corolla-tube. *Fruit* ovoid, smooth, .25 in. long. Hook.

fl. Fl. Br. Ind. III. 177; Miq. Fl. Ind. Bat. II. 281. *Psychotria rostrata* Blume Bijdr. 961. *Polyozus latifolia* (fide Miquel) Bl. Bijdr., 948; DC. Prod. IV. 521, 494.

MALACCA: *Griffith* (K.D.) 3045; *Maingay* (K.D.) 937. JOHORE: *Ridley* 4092. SINGAPORE: *Ridley* 4890. SELANGOR: *Ridley* 7376. DINDINGS, *Ridley* 7992. PERAK: *Scortechini* 1482. *King's Collector* 2190.

We follow previous writers in putting this plant in the same genus as *Chasalia curviflora*, from which it differs in having a corolla with a short wide perfectly straight tube.



MATERIALS

FOR A

FLORA OF THE MALAYAN PENINSULA.

BY

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J. SYKES GAMBLE, C.I.E., F.R.S.,

Late of the Indian Forest Department.

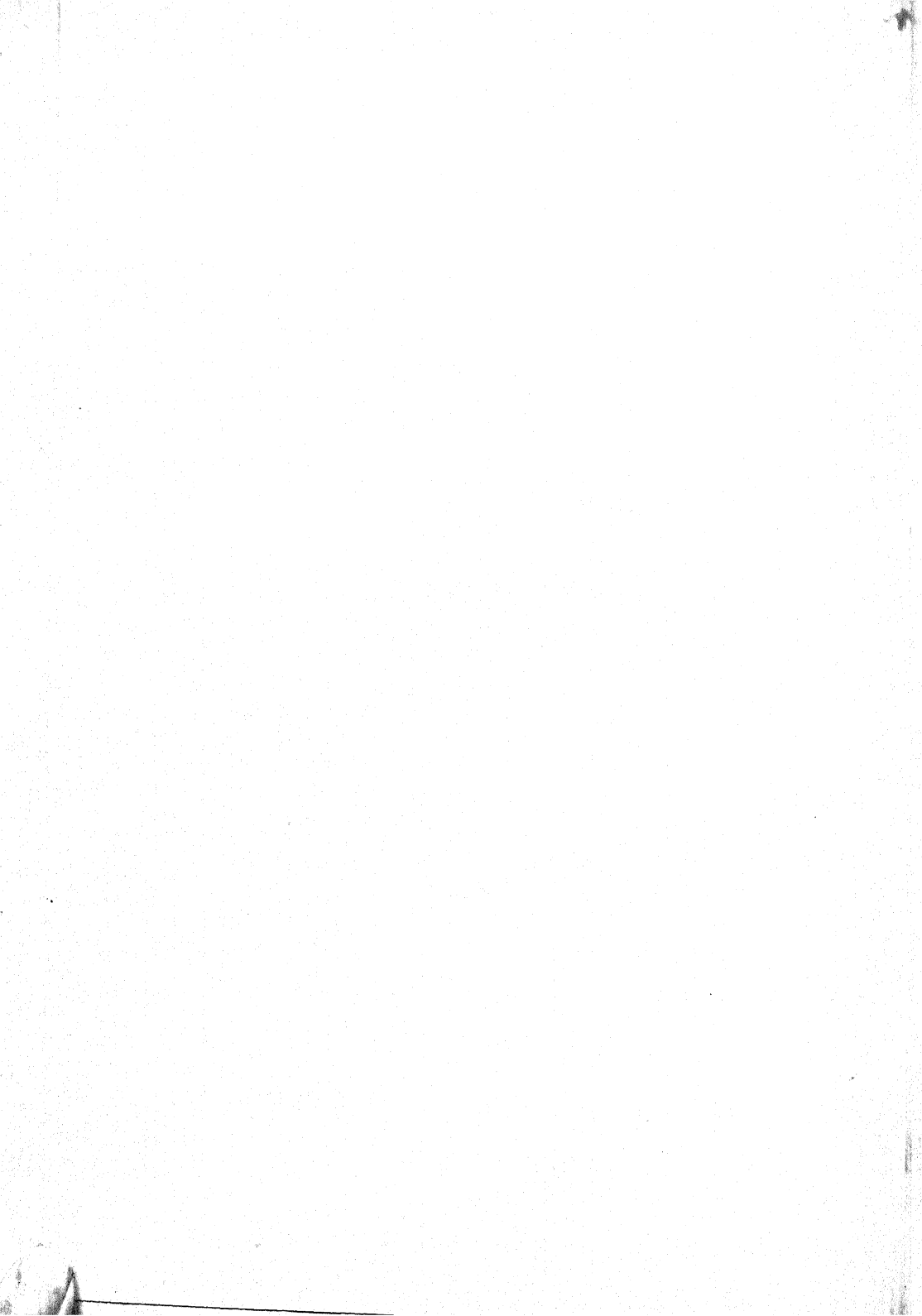
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Materials for a Flora of the Malayan Peninsula.—By SIR GEORGE KING, K.C.I.E., LL.D., F.R.S., *late Superintendent of the Royal Botanic Garden, Calcutta, and J. SYKES GAMBLE, C.I.E., F.R.S., late of the Indian Forest Department.*

No. 20.

The present Part contains the descriptions of three Families, No. 89 *Acanthaceæ*, which was only finished by the late Mr. C. B. Clarke, F.R.S., just before his lamented death in August, 1906, and Nos. 91 *Labiataæ* and 92 *Plantaginaceæ*, which have been done by Lt.-Col. Prain, C.I.E., F.R.S., Director of the Royal Gardens, Kew.

The 3 Families comprise 54 genera and 166 species. In the *Acanthaceæ* there are 35 genera and 134 species, of which 5 genera and 68 species are new. In the *Labiataæ* the genera are 18 and the species 31, one genus being newly described. But it is worthy of note that of the 31 species only 16 are really native in the Malay Peninsula, the rest being introduced plants. One species only is endemic, *Plectranthus Kunstleri*, Prain. In *Plantaginaceæ* there is merely one genus containing one species, an introduced weed.

It may here be usefully recorded that, in addition to his work on the Malay Peninsula *Acanthaceæ* herein given, the late Mr. Clarke also prepared an account of the species of the Malay Archipelago, which will shortly be published in the 'Journal of the Linnean Society.'

Part No. 21, which will contain two Families, No. 86 *Gesneraceæ* and No. 90 *Verbenaceæ*, and thus complete the Gamopetalæ, may be expected to issue about the New Year.

Family LXXXIX.—ACANTHACEÆ.

[By C. B. CLARKE.]

Herbs or shrubs, or twining plants (*Thunbergia*). *Leaves* opposite, often unequal, in *Polytrema* sometimes pseudalternate: stipules 0. *Inflorescence* various; spikes strobilate or heads or cymose or flowers solitary; bracts and prophylla large, small or 0. *Flowers* 2-sexual, irregular. *Calyx* inferior: segments 5 or 4, nearly free or more or less united. *Corolla* gamopetalous; tube campanulate or linear: limb 2-lipped or 5-lobed, more or less 1-sided. *Stamens* on the corolla 4 didynamous, or 2 (with or without rudiments); anther-cells 2 or 1; pollen ellipsoid (then usually ribbed or banded longitudinally) or globose (then often honeycombed or echinulate). *Ovary* superior, 2-celled; ovules 2 to 1, or several, superimposed in vertical rows (or 2 collateral in *Thunbergia*); style long, simple, minutely 2-fid. *Capsule* loculicidal, often elastically dehiscent; seeds usually nearly as many as the ovules, held up on rigid curved *retinacula* (outgrowths of the funicle); albumen 0.—DISTRIB. Species 2000, throughout the warmer parts of the world.

This Family is specially characterized by the retinacula and the seeds placed in a vertical line; this character fails in the first two Subfamilies. The plants of Subfamily II. NELSONIOIDÆ are frequently mistaken for those of SCROPHULARIACEÆ, from which they differ by the seeds being superimposed vertically.

CONSPECTUS OF THE SUBFAMILIES, TRIBES, AND GENERA.

- Subfamily I. THUNBERGIOIDÆ. Seeds 4 to 2 in the capsule without retinacula. Twiners 1. THUNBERGIA.
- Subfamily II. NELSONIOIDÆ. Seeds 8 to 16, vertically superimposed in 2 rows in the capsule on small soft papille (not on hard curved retinacula). Herbs small or of very moderate size:—
- Stamens 2 2. NELSONIA.
- Stamens 4:—
- Flowers in spikes, racemes, or panicles 3. STAUROGYNE.
- Flowers axillary 4. CARDANTHERA.
- Subfamily III. RUELLIOIDÆ. Retinacula present. Corolla-lobes contorted in the bud:—
- Tribe 1. RUELLINÆ. Capsule with more than 4 seeds, which are hygroscopically shaggy on the margin:—
- Pollen honeycombed. Flowers axillary. Capsule clavate 7. RUELLIA.
- Pollen echinate. Capsule seed-bearing from the base .. 8. APORUELLIA.
- Pollen ellipsoid, with many longitudinal ribs. Capsule hardly stalked:—

Corolla distinctly 2-lipped:—

- | | |
|--|----------------|
| Spikes continuous or axillary clusters | 5. HYGROPHILA. |
| Flowers in 1-sided axillary open racemes | 6. NOMAPHILA. |

Corolla obscurely or scarcely 2-lipped:—

- | | |
|--|------------------|
| Thyrus terminal, 8 to 12 by .75 in. | 9. STENOthyRSUS. |
| Spikes terminal or short-peduncled heads | 10. HEMIGRAPHIS. |

Tribe 2. STROBILANTHINÆ. Capsule with 4 (or 2) seeds:—

Pollen ellipsoid, longitudinally ribbed:—

- | | |
|---|--------------------|
| Stamens 4 | 12. STROBILANTHES. |
| Stamens 2 | 11. ENDOPOGON. |
| Pollen globose, echinate. Stamens 4 | 13. ACANTHOPALE. |

Subfamily IV. ACANTHOIDEÆ. Retinacula present. Corolla with the posticous lip cut away; anticous lip 3-lobed, the middle lobe bifid

14. ACANTHUS.

Subfamily V. JUSTICIOIDEÆ. Retinacula present. Corolla-lobes imbricated in the bud, *i. e.* one lobe wholly within, one wholly without, the others:—

Tribe 1. GYMNSTACHYINÆ. Capsule with more than 4 seeds. Bracts inconspicuous, hardly as long as the small sepals, which rarely attain one-fifth inch in length. Stamens 2:—

Capsule cylindric at base; seeds in the clavate top .. 16. PHLOGACANTHUS.

Capsule with parallel sides; seed-bearing from the base:—

Corolla-tube cylindric, scarcely inflated:—

- | | |
|--|-------------------|
| Seeds hygroscopically hairy on the margin .. | 15. GYMNSTACHYUM. |
| Seeds glabrous, stony | 17. ANDROGRAPHIS. |
| Corolla-tube much inflated upwards | 18. CYSTACANTHUS. |

Tribe 2. ASYSTASINÆ. Capsule with 4 seeds. Stamens 4:—

Sepals united at base for at least one-third of their length 20. PHIALACANTHUS.

Sepals nearly free at base:—

Capsule at base cylindric; seeds in the upper wider part:—

- | | |
|---------------------------------------|----------------|
| Anther-cells at equal height | 19. ASYSTASIA. |
| One anther-cell below the other | 21. FILETIA. |

Capsule conic; the 4 seeds near the base 22. LEPIDAGATHIS.

Tribe 3. BARLERIINÆ. Capsule 2- to 4-seeded. Stamens 2, fertile. Calyx large, 4-partite to the base. Anther-cells 2, rounded at base. Pollen globose, reticulated. Corolla yellow, 1.25 in. long

23. BARLERIA.

Tribe 4. ERANTHEMINÆ. Capsule 4- to 2-seeded. Stamens 2. Anther-cells 2, rounded at base. Corolla-tube linear; limb subequally 5-fid, spreading

24. ERANTHEMUM.

Tribe 5. JUSTICIINÆ. Capsule 4- to 2-seeded. Corolla distinctly 2-lipped. Stamens 2. Calyx small, subequally deeply lobed. Seeds smooth or tuberculate, but without needle-like hygroscopic hairs:—

Sect. 1. MONOTHECIÆ. Anthers 1-celled:—

Corolla 1.25 in. long, orange-red 25. CLINACANTHUS.

Sect. 2. TYPICÆ. Anthers 2-celled. The flower not appearing as though enclosed between two opposite bracts. Placentæ in fruit not rising elastically from the base of the capsule:—

- One anther-cell below the other, tailed 26. *JUSTICIA*.
 One anther-cell somewhat below the other, its base
 rounded or acute, scarcely tailed :—
 Corolla-tube broad. Shrub 27. *ADHATODA*.
 Corolla-tube linear; posticous lip small, twisted .. 28. *RHINACANTHUS*.
 Anther-cells at equal or nearly equal height, not tailed :—
 Corolla .3 to .7 in. long :—
 Spikes, racemes, or panicles terminal 29. *LEDA*.
 Cymes small, axillary 30. *POLYTREMA*.
 Corolla 1.25 in. long :—
 Corolla green-blue 31. *ECROLIUM*.
 Corolla red 32. *GRAPTOPHYLLUM*.
 Sect. 3. *HYPOESTEE*. Flower appearing as though en-
 closed between two bracts. Placentæ in fruit not rising
 elastically :—
 Anther-cells 2, one placed higher 33. *PERISTROPHE*.
 Anthers 1-celled 34. *HYPOESTES*.
 Sect. 4. *SOLUTE*. Placentæ rising in fruit elastically from
 the base of the capsule, and throwing out the seeds :—
 Flowers in spikes, with prominent bracts 35. *RUNGIA*.

1. *THUNBERGIA*, Linn. f.

[Character narrowed, as throughout *Acanthaceæ*, to the Malay Penin-
 sula species.]

Twining. *Leaves* petioled, opposite, subequal, undivided, often
 toothed or lobed. *Peduncles* solitary, axillary, running into terminal
 racemes, *i.e.* the upper floral leaves (or bracts) greatly reduced, incon-
 spicuous or obsolete. *Bracteoles* (prophylla) large, often .5 in. long,
 broad-oblong from a truncate base. *Calyx* of 8 to 14 small lanceolate
 teeth, or obsolete (appears a mere rim). *Corolla* large; tube cylindric
 or campanulate; limb of 5 subequal lobes, contorted in the bud.
Stamens 4, subsimilar; anther-cells 2, parallel, sometimes strongly
 spurred at the base; pollen large (50 to 60 μ in diam.), globose, smooth,
 with faint spiral bands or strongly spinous. *Ovary* 2-celled, with 2
 ovules in each cell; stigma of 2 equal, opposite, triangular lobes. *Cap-
 sule* globose, with a long oblong-linear beak; seeds 4, or by suppression
 3 to 2, hemispheric, excavate on the plane face, wrinkled on the spheric
 face; sessile, not held aloft on retinacula.—*DISTRIB.* Species 100, in the
 warm parts of the Old World; most numerous in Africa, extending to
 Australia.

Sect. 1. *Calyx* a mere rim. Anther-cells spurred. Pollen
 smooth :—

- Leaves broad-oblong, entire or slightly toothed 1. *T. laurifolia*.
 Leaves round-ovate, toothed or often lobed 2. *T. grandiflora*.

Sect. 2. Calyx of 8 to 12 teeth. Anther-cells not spurred.

Pollen spinous:—

Petioles not winged. Corolla pure white 3. *T. fragrans*.

Petioles often winged. Corolla yellow, with claret eye .. 4. *T. alata*.

1. *THUNBERGIA LAURIFOLIA*, Lindl. in Gard. Chron. p. 260 (1856). Scandent, up to 150 ft. long (Kurz). *Leaves* 3·5 by 1·5 in., broad-oblong, wide at base, truncate or ovate, glabrous, sub-3-nerved, entire or slightly toothed; petioles ·5 to 1 in. long. *Peduncles* axillary, solitary, distant or more often running into terminal close racemes 2 to 5 in. long; bracteoles (prophylla) 1 in. long, oblong, usually slightly pubescent. *Calyx* a mere rim. *Corolla* 2 in. long, blue or blue and white; tube campanulate, only contracted for a very short space at the base. *Stamens* 4, subsimilar; filaments glabrous; anther-cells with a rigid long spur at the base, fringed with many long pilose hairs; pollen globose, large (50 μ in diam.), smooth, with obscure broad spiral bands. *Pistil* glabrous; the two stigmatic lobes sub-opposite. *Capsule* globose, smooth, brown, ·25 in. in diam., with 4 to 2 seeds; beak 1 to 1·25 in. long, oblong-linear. *Seeds* hemispheric, cerebro-granular, excavated on the plane face. Hook. Bot. Mag. t. 4985; Kurz For. Fl. II. 240; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 392; Lindau in Engl. Jahrb. XVII. (1893) Beibl. 41, pp. 41, 42, and in Engl. & Prantl Pflanzenfam. IV. 3B, 292; Ridley in Trans. Linn. Soc. ser. 2, III. (1893) 332. *T. Harrisii*, Hook. Bot. Mag. t. 4998.

MALACCA: *Maingay* (K.D.) 1170; Thoban Isle, *Helper*; Goping, *King's Collector* 1064. PERAK: *Wray* 3145; *Scortechini* 2197; *King's Collector* 3030, 8418. PULAU MANIS: fide *Ridley*. PENANG and KEDAH: *Curtis*.—DISTRIB. Northwards to Arracan.

2. *THUNBERGIA GRANDIFLORA*, Roxb. Hort. Beng. 45 (1813 to 1814). *Leaves* ovate or rounded, 3 to 6 in. in diam., pubescent beneath, palmately 5- to 7-nerved from the base, usually angular or lobed, rarely nearly entire; otherwise as *T. laurifolia*. Roxb. Fl. Ind. III. 34; Hook. Bot. Mag. t. 2366; Nees in DC. Prodr. XI. 54 (*with all syn. except* Roxb. Cor. Pl. t. 67); Kurz For. Fl. II. 240; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 392; Lindau in Engl. Jahrb. XVII. (1893) Beibl. 41, pp. 37, 39, and in Engl. & Prantl Pflanzenfam. IV. 3B, 292; Hemsl. in Journ. Linn. Soc. XXVI. (1890) 237; Prain Beng. Plants 796. *Flemingia grandiflora*, Rottler in Neue Schr. Gesell. Nat. Freunde IV. (1803) 202.

SINGAPORE: *Schomburgk* 84.—DISTRIB. Bengal to South China. Perhaps Schomburgk's specimen was from a cultivated plant.

This species runs excessively close to *T. laurifolia*, but Lindau has put *T. grandiflora* in a different Section because it has "flowers solitary, axillary." The inflores-

cence is exactly the same in both species; in *T. grandiflora* the flowers are very generally in terminal racemes, the upper bracts (floral leaves) being often only .25 to .5 in. long.

3. *THUNBERGIA FRAGRANS*, Roxb. Cor. Pl. I. 47 t. 67 (1795). Twining, often 4 to 8 ft. long. *Leaves* 3 by 1 to 1.5 in., oblong or elliptic, obtuse, rounded or hastate at base, nearly entire, nearly glabrous or (in form *javanica*) pubescent, sub-3-nerved; petiole .25 to .5 in. long. *Peduncles* 1 to 3 in. long, axillary, solitary, rarely two together; bracteoles (prophylla) .5 to .7 in. long, oblong-lanceolate. *Calyx* of about 12 narrow-oblong teeth .15 in. long. *Corolla* white; tube .5 to .75 in. long, narrow-oblong, contracted at top and bottom; limb of 5 obovate, emarginate, spreading lobes. *Stamens* 4, in the corolla-tube, glabrous; anthers not spurred; pollen globose (50 μ in diam.), the borders of the spiral bands carrying spines so long that the bands are obscured. *Pistil* glabrous; the 2 stigmatic lobes opposite. *Capsule* cuboid-globose, .4 in. in diam.; beak .8 in. long, oblong-linear. *Seeds* 4 (or by suppression fewer), hemispheric, cerebroid, granular, with a hole in the plane face. Nees in DC. Prodr. XI. 56; Kurz For. Fl. II. 240; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 390 (*with all syn.*); Lindau in Engl. Jahrb. XVII. (1893) Beibl. 41, pp. 36, 38, and in Engl. & Prantl Pflanzenfam. IV. 3 B, 292; Ridley in Trans. Linn. Soc. ser. 2, III. (1893) 332, and in Journ. As. Soc. Straits 121 (Singapore 1900); Hemsl. in Journ. Linn. Soc. XXVI. (1890) 237; Prain Beng. Plants 795.

PEKAN: fide Ridley. — *DISTRIB.* Throughout India, extending to Timor; Philippine Islands (Palawan, *Bermejos* 193).

FORMA β *javanica* (sp.), Gaertn. f. Fruct. III. (1805) 22 t. 183, fig. 4; leaves beneath, petioles, and peduncles pubescent (in Wray 52, rufous shaggy). Blume Bijdr. 806; Moritzi! Verz. Zollinger Pfl. 46; Hassk. Cat. Hort. Bogor. 147.

SINGAPORE: *Kunstler* 25; Ulu Kenring, *Wray* 52. KEDAH: *Curtis*. — *DISTRIB.* Throughout Malaya to North Australia.

4. *THUNBERGIA ALATA*, Sims Bot. Mag. t. 2591 (1825). Villous. *Leaves* cordate-ovate, subentire; petioles 1 to 2 in. long, often winged. *Corolla* yellow or nearly white; tube with a dark claret mouth, exactly cylindric, twice as thick as that of *T. fragrans*, otherwise resembling *T. fragrans*. Bojer Hort. Maurit. 259 (1837); Hook. Exot. Fl. III. t. 177, Bot. Mag. t. 3512; Kurz For. Fl. II. 240; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 491; Lindau in Engl. Jahrb. XVII. (1893) Beibl. 41, 37, 40, and in Engl. & Prantl Pflanzenfam. IV. 3 B, 292; Burkill in Dyer Fl. Trop. Afr. V. 9, 16; Prain Beng. Plants 795; Ridley in Journ. As. Soc. Straits 121 (Singapore 1900).

SINGAPORE: *Kunstler* 151; *Deschamps*.—DISTRIB. Native in warm Africa and Mascarenia, a common plant; runs wild as a weed in India and South-East Asia.

2. NELSONIA, R. Br.

A diffuse herb. *Leaves* opposite, subequal. *Flowers* small, in dense small spikes; bracts spiral or alternate (not opposite). *Calyx* small, sub-4-lobed. *Corolla*-tube slender; limb 2-lipped. *Stamens* 2; anthers 2-celled, subincluded in the corolla-tube. *Ovary* 2-celled; ovules about 8 in each, arranged vertically in two rows on the double placental line in each cell. *Capsule* ovoid-conic, with 8 to 16 seeds in the basal half; retinacula 0.—DISTRIB. Species 1, in warm parts of Africa, India, Australia, America.

N.B.—This plant is often sorted amongst SCROPHULARIACEÆ; nor does it differ except by the arrangement of the ovules and seeds in one vertical line on the margin of the carpellary leaf.

1. NELSONIA CAMPESTRIS, R. Br. Prodr. 481 (1810). Prostrate, hairy; branches often 12 to 18 in. long. *Leaves* of stem 2 to 3 in. long, oblong or obovate, nearly entire, long-petioled or nearly sessile; basal leaves often 6 in. long. *Flowers* in small heads, .5 in. in diam.; terminal or on axillary peduncles which lengthen out in fruit to 2 to 3 in.; bracts ovate, .15 in. long; bracteoles very small. *Calyx* .125 in. long, 2-lipped; one lip deeply 3-fid, the other shortly 2-fid. *Corolla* .15 in. long, rose or white. *Pistil* glabrous; style shortly 2-fid. *Stamens* 2; anther of 2 ellipsoid cells half-divergent; pollen globose, 25 μ in diam., subtetrahedral (almost as in *Scrophulariaceæ*). *Capsule* .15 in. long; seeds ellipsoid, brown, granular. Endl. Iconogr. t. 79; Benth. Fl. Austral. IV. 543; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 394 (*with all syn.*); Burkill in Dyer Fl. Trop. Afr. V. 28; Prain Beng. Plants 797. *N. tomentosa*, Nees in Wall. Pl. As. Rar. III. (1832) 79; Nees in DC. Prodr. XI. 65; Miq. Fl. Ind. Bat. II. 770. *N. brunelloides*, O. Kuntze Revisio I. 493; Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 289, t. 110, fig. c.

KEDAH: *Ridley* 8312. PENANG: *Curtis* 50, 1750; *Deschamps*. PAHANG: *Ridley* 2181.—DISTRIB. In warm regions of both hemispheres.

The innovations are often densely white-hairy; there are also often long white hairs at the base of the flower. The var. β *vestita*, of Fl. Br. Ind. IV. 395 (which has large leaves, up to 8 to 10 in. long, on the branches), is frequent in Lower Burma, but there is no example of it from the Malay Peninsula.

3. STAUROGYNE, Wall.

Undershrubs, 6 to 24 in. (rarely 3 to 4 ft.) high, at base often woody, creeping, hairy (in *S. subglabra* nearly glabrous). *Leaves* opposite, equal, simple, entire; petioles usually long, rarely short, .25 to .5 in. *Flowers* in spikes (or spike-like racemes, the pedicels up to .15 in.), dense or lax; the spikes sometimes paniced. *Bract* usually a little longer than the calyx, sometimes considerably broader; two prophylla (often alternate), linear or nearly linear, a little shorter than the bract. *Calyx* .15 to .6 in. long, divided nearly to the base into 5 narrow persistent segments (often called sepals); of these one is often longer and sometimes much broader than the others. *Corolla* .5 to 1 in. long, tubular-campanulate, rather narrow; limb of 5 short rounded segments (often colorate). *Stamens* 4 didynamous, fertile; filaments sparsely hairy, and with gland-tipped hairs near the top; anthers of 2 ellipsoid cells, ultimately divaricate; pollen globose, with three longitudinal bands not reaching the poles, 25 to 30 μ in diam. *Ovary* oblong, surrounded at base by a disk, glabrous or rarely with minute scattered hairs; style long, sometimes with a few hairs in the lower part; branches 2, unequal. *Capsule* oblong, .2 to .25 in. long, ovoid at base, acute at top, glabrous or sometimes slightly minutely hairy, 2-celled, separating loculicidally into 2 valves, bearing seeds from the base; seeds 12 to 20 in each capsule, in vertical rows on the edges of the carpellary leaves. *Seeds* attached on very small papillæ, not on retinacula, short-ellipsoid, 400 μ long, yellow-brown ultimately black, smooth, more or less reticulate, minutely pitted.—DISTRIB. Species 40 in South-East Asia, 10 in Brazil.

Some of the Brazil species have flowers and capsules considerably larger than in the Asiatic species. The Asiatic species are so uniform in the corolla, stamens, and pistil—even down to the hairs thereon—that these are not described for the subjoined Malay species, which are separated mainly by characters of the bracts and calyx.—The posticous stigmatic lobe (both in the type species *S. argentea*, and in some others) is occasionally somewhat 2-lobed.

Calyx .3 to .7 in. long:—

Sepals awned or with a stiff mucro:—

Fruit-spikes 1 to 2 in. long:—

- | | |
|--|------------------------------|
| Spike in fruit ovoid; leaves 2.5 in. long .. | .. 1. <i>S. setigera</i> . |
| Spike in fruit oblong; leaves up to 4 to 5 in. long .. | .. 2. <i>S. lanceolata</i> . |

Fruit-spikes 2 to 3.5 in. long:—

- | | |
|---|--------------------------------|
| Awn of sepals with long several-celled hairs.. | .. 3. <i>S. malaccensis</i> . |
| Awn of sepals hardly microscopically scabrid .. | .. 4. <i>S. angustifolia</i> . |

Fruit-spikes 4 to 10 in. long:—

- | | |
|--|------------------------------|
| Awn of sepals hardly microscopically hairy.. | .. 5. <i>S. Kingiana</i> . |
| Awn of sepals with short spreading hairs .. | .. 6. <i>S. longifolia</i> . |

Sepals acute, hardly awned :—

Leaves at tip acute or subacute :—

Spikes in fruit rather dense, often recurved 7. *S. comosa*.

Inflorescence of one poor terminal panicle 8. *S. pauper*.

Spikes in fruit long, very lax, paniced :—

Bracts and calyx with short hairs 9. *S. elongata*.

Bracts and calyx viscous, with gland-tipped hairs 10. *S. lasiobotrys*.

Leaves at tip rounded; bracts elliptic, obtuse 11. *S. Griffithiana*.

Sepals with linear obtuse tip :—

Leaves elliptic obtuse; sepals hairy 12. *S. arcuata*.

Leaves lanceolate-acute; sepals glabrous 13. *S. subglabra*.

Calyx .125 to .175 in. long :—

Corolla .6 in. long :—

Leaves with triangular obtuse tip, upper surface pubescent 14. *S. merguensis*.

Leaves lanceolate-acuminate, upper surface glabrate 15. *S. racemosa*.

Corolla 1 in. long 16. *S. macrantha*.

Corolla .75 in. long; leaves serrulate 17. *S. serrulata*.

1. STAUROGYNE SETIGERA, O. Kuntze Revisio I. 497 (1891). A weak herb, 4 to 12 in. long, often branched or decumbent. *Stem* pubescent, usually rusty upwards. *Leaves* 2.5 by .75 to 1 in.; tip triangular; base ovate or cuneate; mature nearly glabrous on both surfaces; petiole .25 to .5 in. long. *Inflorescence* of one terminal sessile head (a second on a short axillary peduncle sometimes added), ovoid, dense, .5 to .6 in. in diam., in fruit lengthening out to 1 in., rarely to 1.5 in. *Sepals* linear, very slightly unequal, the longest one .4 in. long, linear, scarcely linear lanceolate; its awn with many patent short hairs, and also long several-celled scattered hairs, but no gland-headed hairs. *Corolla* .6 in. long, from purple-pink to pink-white, nearly glabrous without in the bud. *Ovary* glabrous; style base with a few hairs. *Capsule* .2 in. long. *Ebermaiera setigera*, Nees in DC. Prodr. XI. 76; T. Anders. in Journ. Linn. Soc. IX. 451 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 398; Ridley in Trans. Linn. Soc., ser. 2, III. 332 (1893), and in Journ. As. Soc. Straits 121 (Singapore 1900). *E. trichocephala*, Miq. Fl. Ind. Bat. II. 774. *E. subcapitata*, C. B. Clarke in Bot. Tidsskr. XXIV. 348 (Kjobenhaven 1902). *Adenosma uliginosa* var. β *erecta*, Nees in DC. Prodr. XI. 70; Miq. Fl. Ind. Bat. II. 771 partly (not of R. Br.).

MALACCA: Cuming 2355. PERAK: Scortechini; Wray 1878; Larút Perak, 500 to 800 ft., King's Collector 2192. GOPING: King's Collector 1132. PAHANG: Ridley 2178 (partly). SELANGOR: Curtis 2363; Kota Glanggi, fide Ridley.—DISTRIB. Common in Sumatra, also in Java, Borneo, Siam.

The dried specimens of this species are dusky green, often obscurely red-brown at top, the leaves sometimes whitened beneath. Kurz, in Journ. As. Soc. Beng. II.

78 (1870), united the three species, *S. setigera*, *S. argentea*, and *S. lanceolata*; they are undoubtedly very closely allied.

2. *STAUROGYNE LANCEOLATA*, O. Kuntze Revisio I. 497 (1891). *Stem* 6 to 14 in. high, erect, woody, undivided. *Leaves* 4 to 5 by 6 to 1 in. (or smaller), lanceolate or generally narrow-lanceolate, nearly glabrate on both surfaces. *Inflorescence* 1 in. long, in fruit 1.5 to 2 in. long, less dense than that of *E. setigera*, Nees. *Bracts*, *prophylla*, and *calyx* as of *E. setigera*, the longest sepal a trifle broader, linear-lanceolate at base. *Corolla* hairy without in the bud. *Adenosma lanceolatum*, Blume Bijdr. 756. *Ebermaiera lanceolata*, Hassk. Cat. Hort. Bogor. 147; Nees in DC. Prodr. XI. 76; Miq. Fl. Ind. Bat. II. 774 (not of C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 397). *E. longifolia*, Ridley in Trans. Linn. Soc., ser. 2, Bot. III. 332 (1893).

PAHANG: Ridley 2177, 2178 (partly). MALACCA: Derry 23.—
DISTRIB. Java (Zollinger 591).

3. *STAUROGYNE MALACCENSIS*, C. B. Clarke. Herbaceous, 4 to 8 in. high, often branched. *Stem* hairy, often rusty at top, carrying 1 to 4, sometimes 8, spikes. *Leaves* up to 4 by 1 in., elliptic-lanceolate; base cuneate; mature with nearly glabrate surfaces; petiole .5 to 1 in. long. *Heads* 1 to 1.5 in. long, dense, in fruit lengthening to 2 to 3.5 in., lax, sometimes interrupted at base. *Bracts* oblong or elliptic-oblong, conspicuous, somewhat persistent. *Sepals* .4 in. long, conspicuously unequal, the larger one lanceolate or elliptic-lanceolate, acuminate, hardly awned, the other 4 nearly linear; tips of all the sepals with many, short, patent hairs and scattered, long, several-celled hairs. *Corolla* .6 in. long, nearly glabrous without. *Ovary* with scattered minute gland-tipped hairs in the upper half, which remain till the seeds are quite ripe. *Ebermaiera argentea*, Nees in DC. Prodr. XI. 76 (partly); T. Anders. in Journ. Linn. Soc. IX. 451 (1867). *E. lanceolata*, C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 397 (exclud. syn.) (not of Nees). *E. Staurogyne*, T. Anders. MS. in hb. Calcutta (not of Nees).

KEDAH and KASOOM: Curtis. PENANG: Curtis 1931. MALACCA: Griffith 189; Ridley 1636. PROVINCE WELLESLEY: Ridley 6198.—
DISTRIB. Java; Tenasserim.

The type *Staurogyne argentea*, Wall. Pl. As. Rar. II. 80 t. 186 (1831), is the common Khasia species, remote from the present, but (as Wallich says) very near *S. angustifolia*, Wallich. *Staurogyne argentea*, O. Kuntze (and of Lindau), includes probably *S. argentea* and *S. angustifolia*, but not *S. malaccensis*.

4. *STAUROGYNE ANGUSTIFOLIA*, Wall. Pl. As. Rar. II. 81 (1831). *Stem* 8 to 12 in. long, suberect, little divided, hairy, almost woody at

the base. *Leaves* glabrate on the surface; blade 3 to 4 by .7 to 1 in., lanceolate, mostly narrowly lanceolate (but see the var. below), base attenuate, tip triangular, subacute; petiole 1 to 2 in. long. *Spikes* terminal and on short axillary peduncles, in flower ovoid or ellipsoid, dense, in fruit often 2 to 3 in. long. *Bract* narrow-oblong, aristate, with long hairs in the lower part. *Calyx* unequal, the largest sepal .6 in. long, the base narrow-lanceolate, with long hairs; the awn long, somewhat rigid, glabrous or with minute bristles (less than 40 μ long); the other 4 sepals nearly linear. *Corolla* .6 in. long, hairy without. *Capsule* .2 in. long, thicker than in the neighbouring species. *S. argentea*, O. Kuntze Revisio I. 497 *partim* (1891) (*not* of Wall.). *Ebermaiera angustifolia*, T. Anders. in Journ. Linn. Soc. IX. 451 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 398; Prain Beng. Plants 798. *E. Staurogyne* β *angustifolia*, Nees in DC. Prodr. XI. 75.

PERAK: Ridley 9766; Curtis. MALACCA: Goodenough 1689.—
DISTRIB. Mergui (Falconer 860), Tavoy (Wallich 4906).

T. Anderson has written "*E. angustifolia*" on Falconer 860; but his name "*angustifolia*" (as well as Wallich 4906) may include other nearly allied forms. The true *E. Staurogyne*, Nees, is a Khasia species, in which the bract and sepals have no long several-celled hairs. This plant is put with *S. longifolia*, not with *E. Staurogyne*, by collectors. The leaves in all the examples seen have dried brown-red.

5. *STAUROGYNE KINGIANA*, C. B. Clarke, n. sp. *Stems* 2 to 3 ft. high, pubescent. *Leaves* glabrous; blade up to $8\frac{1}{2}$ by 2 to 3 in., elliptic, narrowed at either end; main nerves 12 to 15 pair; petioles 1 to 2 in. long. *Spikes* 3 to 6 on a stem, terminal and on short axillary peduncles, 4 to 10 in. long, undivided, dense even in fruit. *Bract* linear, .8 in. long. *Sepals* 5, nearly equal, linear, longest up to .75 in. long, very little dilated at the base, sparsely hairy at base, glabrous or minutely scabrous in the upper half. *Corolla* 1 in. long, "yellowish-white, lower lip pale red" (collector's note), glabrous without. *Stamens* and pollen of the genus. *Pistil* glabrate. *Capsule* .2 in. long, rather thick; the endocarp much thickened, almost corky. Allied to *S. angustifolia*, T. Anders.

PERAK: on limestone hills, 500 to 800 ft. alt., King's Collector 10704; Goenong Panti, King's Collector 208. PAHANG: Ridley 2176.

6. *STAUROGYNE LONGIFOLIA*, O. Kuntze Revisio I. 497 (1891). Sub-erect, 8 to 30 in. high, hairy. *Stem* (in large examples) woody, robust below, and with erect branches. *Leaves* glabrous on the upper surface; blade 5 by 1 in., lanceolate, attenuate at either end (in the type example, but the leaves are frequently longer, and there are examples with shorter, broader leaves); petiole 1 to 1.5 in. long. *Spikes* short-peduncled at the end of branches and in the axils, short-oblong (often nodding) when

young, in fruit 2 to 5 in. long, somewhat dense, erect. *Bract* and *calyx* softly hairy, without long, fine, several-celled hairs; bract narrow-lanceolate, aristate, .6 in. long; sepals all linear, the longest one .5 in. long, including its awn .16 in. long, the awn hairy to the tip with spreading hairs varying in length, but all short. *Corolla* long, hairy without; tube nearly white, segments and mouth pink to purple. *Pistil* glabrate. *Stamens* and pollen of the genus. *Capsule* .2 in. long. Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 288. *Ebermaiera longifolia*, Nees in DC. Prodr. XI. 76; T. Anders. in Journ. Linn. Soc. IX. 451 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 399; Ridley in Trans. Linn. Soc. ser. 2, III. 332 (1893).

MALACCA: *Cuming* 2350; *Lemann*; *Griffith* (K.D.) 6079; *Hullett* 403. PERAK: *Scortechini* 155; *Wray* 1302; *Ridley* 1604; alt. 300 to 800 ft., *King's Collector* 5821, 8678. SELANGOR: *Ridley* 7590. NEGRI SEMBILAN: *Ridley* 10098. PAHANG: Tahan, fide *Ridley*.

This species is very close both to *S. angustifolia* and to *S. comosa*; the former differs by having the awns of the sepals glabrous or microscopically scabrous; the latter differs in that the sepals have lanceolate-linear soft tips, hardly awns.

7. STAUROGYNE COMOSA, O. Kuntze Revisio I. 497 (1891). *Stem* 1 to 3 ft. high, almost woody below, hairy. *Leaves*: blade up to 8 by 3 to 3.5 in., cuneate at either end; upper surface glabrous, obscurely minute-granular-tuberculate; petiole 1 to 2.5 in. *Spikes* short, peduncled, undivided, dense, in flower 1 to 4 in. long, nodding, in fruit up to 5 to 7.5 in. long, often deflexed, rather dense (scarcely interrupted at base), softly hairy. *Bract* and *sepals* softly hairy, with long several-celled hairs; bract .4 in. long in Wallich's type (often longer), lanceolate-acuminate, point linear (hardly awned), with soft white hairs; sepals .3 in. long in Wallich's type (often longer), the longest (wider than the others) lanceolate with a linear soft-hairy tip. *Corolla* in the bud densely clothed with deflexed hairs without. *Pistil* glabrous. *Stamens* and pollen of the genus. *Capsule* .2 in. long. Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 288. *Ruellia* ? *comosa*, Wall. Cat. 2414. *Ebermaiera axillaris*, Nees in Wall. Pl. As. Rar. III. 80, and in DC. Prodr. XI. 75; T. Anders. in Journ. Linn. Soc. IX. 452 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 399.

PENANG: *Wallich* 2414. PERAK: *Scortechini* 777; *Wray* 2192; *Ridley* 2893; 500 to 800 ft., *King's Collector* 10705; Larut, 100 ft., *King's Collector* 1834. SELANGOR: (*Ridley*) 7589, 8543, 10546.

King's Collector notes the calyx "velvety claret-coloured," the corolla "blue-white, darker inside." The corolla seems caducous, as the large well-collected material provides buds and fruit only. The type examples of Wallich from Penang

are unusually small specimens. This species is generally distinguishable from *E. longifolia*, Nees, by its much broader (elliptic) leaves.

8. *STAUROGYNE PAUPER*, C. B. Clarke, n. sp. *Stem* 18 in. long, undivided, glabrate, decumbent, woody at base. *Leaves* glabrate, with few scattered, white, adpressed bristles on the upper surface; blade 4·5 by 2 in. long, elliptic-lanceolate, acuminate, acute; base cuneate; petiole 2·5 to 5 in. long. *Inflorescence* of one terminal poor panicle, 3 by 1½ in., with few distant flowers; bracts 5 in. long, linear, soft, not awned. *Sepals* subequal, 5 in. long, linear, with soft hairs and many gland-tipped hairs. *Corolla* 6 in. long, pubescent without, "pale yellow with dark stripes" (King's Collector). *Pistil* of *Staurogyne*, glabrous except a few small hairs in the lower part of the style.

PERAK: alt. 200 ft., King's Collector 2832.

9. *STAUROGYNE ELONGATA*, O. Kuntze Revisio I. 497 (1891). Slightly hairy. *Leaves* glabrate; blade 6 by 2 in., oblong-elliptic, cuneate at either end; nerves 8 to 10 pair, thin; petiole 2 to 3 in. long. *Spikes* up to 4 to 7 by 1 in., paniced, lax; pedicels often 1·75 in. long, with alternate prophylla. *Bracts* nearly 5 in. long, lanceolate-linear, with short white hairs, no gland-tipped hairs. *Sepals* 5, linear, the longest nearly 5 in. long, slightly widened at base. *Corolla* (buds) 4 in. long, scarcely pubescent without. *Capsule* 2 in. long, the upper half with scattered minute hairs. Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 288. *Adenosma elongatum*, Blume Bijdr. 757. *Erythracanthus elongatus*, Nees in DC. Prodr. XI. 78, var. β excl. *Ebermaiera elongata*, Nees in DC. Prodr. XI. 721, var. β excl.; T. Anders. in Journ. Linn. Soc. IX. 452 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 400 (not of Miquel).

PENANG: Wallich (fide T. Anderson).—DISTRIB. Java.

The var. β of Miquel (here excluded) is *Ebermaiera debilis*, T. Anders. (in Journ. Linn. Soc. IX. 452, in note (1867)), a weak Philippine species. *E. elongata*, Miquel (Fl. Ind. Bat. II. 775), was (so Miquel says) = *E. Griffithiana*, T. Anders.; and, from Miquel's description, it must have been largely (or wholly) that species. As to *E. subpaniculata*, Hassk. (Retzia I. 77 (1855)), there are now here examples both of the Salak wild plant and of that cultivated at Buitenzorg; they may be varieties of *E. elongata*, Nees, but do not match it. The above description of *E. elongata*, Nees, is wholly from the Java type plant; no example from Penang has been seen.

10. *STAUROGYNE LASIOBOTRYS*, O. Kuntze Revisio I. 497 (1891). *Stem* 18 to 20 in., suberect, hairy. *Leaves* glabrate; blade 5 by 1·5 in., oblong or elliptic-lanceolate, cuneate at either end, thin; petiole 1 to 3 in. long. *Spikes* up to 4 to 6 by 1 in., paniced, lax, softly viscous-hairy; pedicels often 1·6 in. long. *Bracts* 3·5 in. long, linear, with several-celled hairs ended by a coloured gland. *Sepals* 5, linear, the longest 3·5 in.

long, with several-celled gland-tipped hairs. *Corolla*, *stamens*, *capsule* as of *S. elongata*. *Ebermaiera lasiobotrys*, Nees in DC. Prodr. XI. 721; Wall. Cat. 9084; T. Anders. in Journ. Linn. Soc. IX. 452 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 400.

PERAK: Curtis 1350; *King's Collector* 8370 ("Flower dark-red tipped with pink"); Larut, 500 to 1000 ft., *King's Collector* 2292. SELANGOR: Ridley 7588.—DISTRIB. Moulmein, Mergui, Tavoy.

11. STAUROGYNE GRIFFITHIANA, O. Kuntze Revisio I. 497 (1891). *Stem* 4 to 8 in. long, creeping at base. *Leaves* (mature) shortly rather dense hairy on the upper face; blade 5·5 by 3 in. in Griffith's type (often smaller), roundly elliptic, very obtuse; base rounded or cordate (but cuneate in many examples); petiole ½ to 2 in. long. *Inflorescence* simple or branched; main spike 6 in. long in Griffith's type, lax, only slightly hairy. *Bracts* up to ½ in. long, elliptic, rounded, obtuse at top. *Sepals* 5, the longest ¼ in. long, linear; tip linear-acute, not awned, with sparse short several-celled hairs not gland-tipped. (In the Perak example the sepals are linear-ligulate-obtuse at the tip.) *Corolla* 6 in. long, white, rarely tinged pink. *Capsule* ½ in. long. *Erythracanthus Griffithianus*, Nees in DC. Prodr. XI. 78. *E. obtusus*, Wight Ic. t. 1491 (not of Nees). *Ebermaiera Griffithiana*, T. Anders. in Journ. Linn. Soc. IX. 452 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 400; Ridley in Trans. Linn. Soc. ser. 2, III. 332 (1893), and in Journ. As. Soc. Straits 121 (Singapore 1900). *E. elongata*, Miq. Fl. Ind. Bat. II. 775 (mainly).

MALACCA: Griffith (K.D.) 6078; Goodenough 1509. SINGAPORE: Ridley; Hullett 613; G. King. PAHANG: Ridley 2175. PERAK: alt. 600 to 1000 ft., Scortechini 40; *King's Collector* 10335. PAHANG: at Tahan, fide Ridley.

12. STAUROGYNE ARCUATA, C. B. Clarke, n. sp. *Stem* 4 to 8 in. long, villous, woody, creeping. *Leaves* with scattered hairs above or glabrate; blade 4·5 by 2·5 in., ovate elliptic, tip triangular obtuse; base cuneate or sometimes rounded; petiole ½ to 1·5 in. long. *Spikes* often 2 or 3, lax, 2 to 4 in. long, arcuate in fruit; bracts linear or sublanceolate, ½ in. long, hairy. *Sepals* subequal, ½ in. long, linear or very narrow-ligulate, hairy, tip subobtuse. *Corolla* 6 in. long, pubescent without, red (Wray). *Capsule* ½ in. long.

PERAK: Scortechini 456, 728; Wray 48, 694; Ridley 2892.

13. STAUROGYNE SUBGLABRA, C. B. Clarke, n. sp. Nearly glabrous. *Stem* 6 to 12 in. *Leaves* glabrous, the upper surface sometimes obscurely puberulous; blade 4·5 by 1 to 1·25 in., lanceolate or broad-lanceolate, subacute; base cuneate; petiole ½ to 1 in. long. *Spikes* often 2 to 4, very loose, up to 3 to 5 in. long; the rachis microscopically scabrous;

bracts .5 in. long, linear, or the lower ones oblong. *Sepals* subequal, .5 in. long, linear, or scarcely oblong-linear, subobtusate, glabrous, almost shining. *Corolla* .6 in. long, very white (King's Collector). *Capsule* .2 in. long.

PERAK: *Scortechini* 5386, 406; *Ridley* 5514; *Curtis*, alt. 3500 to 4000 ft.; *King's Collector* 8427.

This species is very similar to *E. arcuata* in all essential points; the two characters of hairy sepals with elliptic obtuse leaves, and glabrous sepals with lanceolate leaves, are, however, concomitant throughout the ample material.

14. *STAUROGYNE MERGUENSIS*, O. Kuntze Revisio I. 497 (1891). *Stem* 4 to 8 in. long, creeping at base, pubescent. *Leaves* minutely pubescent on the upper surface; blade up to 5 by 2.5 in. (much smaller in Helfer's type); tip obtusely triangular; base nearly always cordate; petiole .5 to 1.5 in. long. *Spikes* usually peduncled, often paniculate, 2 to 3 in. long, very lax, thin. *Bracts* scarcely .25 in. long, linear-lanceolate or linear. *Sepals* 5, subequal, united at the base, .125 to .175 in. long, linear, hispid. *Corolla* .6 in. long, light blue or violet and white, pubescent without. *Capsule* .25 in. long. *Ebermaiera merguensis*, T. Anders. in Journ. Linn. Soc. IX. 452 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 402.

PERAK: *Wray* 3966; *Scortechini* 285, 1356, alt. 400 to 600 ft.; *King's Collector* 8284; *Wray* 4158. TRANG: *Goldham*. KEDAH: *Curtis*. —DISTRIB. Mergui.

This species in habit much resembles *E. incana*, and there is little to separate it except the small bracts; the hairs on the upper surface of the mature leaves are similar but smaller.

15. *STAUROGYNE RACEMOSA*, O. Kuntze Revisio I. 497 (1891). *Stem* 1 to 2 ft. high, pubescent, creeping at base. *Leaves* glabrate, usually drying a red-brown; blade 4 by 1.25 in., broadly lanceolate, acuminate at either end; petiole .5 to 1.5 in. long. *Spikes* usually peduncled, simple or paniced, pubescent, up to 3 to 5 in. long, very lax; pedicels distant, exceedingly short; bracts lanceolate, hairy, .175 in. long. *Calyx* of 5 equal lanceolate lobes, .175 in. long. *Corolla* .6 in. long, white, tipped rose or purplish, pubescent without. *Capsule* .2 in. long, broad-oblong. T. Anders. in Journ. Linn. Soc. IX. 452 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 401; Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 288. *Ruellia racemosa*, Roxb. Fl. Ind. III. 42. *Ebermaiera racemosa*, Miq. Fl. Ind. Bat. II. 775. *Erythracanthus racemosus*, Nees in Wall. Pl. As. Rar. III. 80, and in DC. Prodr. XI. 78.

PENANG: *Wallich* 2336; *Stoliczka*; *Deschamps*; *Hullett* 124; *Maingay* (K.D.) 1173; alt. 2000 ft., *King's Collector*; *Curtis* 406. MALACCA:

Griffith. SINGAPORE: *Walker* 197. INDRAGERI: *Curtis.* — **DISTRIB.** Moulmein.

16. *STAUROGYNE MACRANTHA*, C. B. Clarke, n. sp. *Stem* 3 to 4 ft. long, villous. *Leaves* glabrous, with a very few remote hairs on the upper surface; blade 4.5 by 1.75 in., elliptic-lanceolate, subacute; base cuneate; petiole .25 to 1 in. long, villous. *Peduncles* two, penultimate, 3 in. long, villous, carrying small few-flowered panicles; bracts .2 in. long, linear, very hairy. *Sepals* subequal, .175 in. long, linear, very hairy. *Corolla* 1 in. long, pubescent without.

PERAK: at Larut, alt. 4500 to 5000 ft., *King's Collector* 2417.

17. *STAUROGYNE SERRULATA*, C. B. Clarke, n. sp. *Stem* elongate, villous upwards. *Leaves* 4 to 5 by 1.75 in., elliptic, acuminate at either end; margin closely serrulate; both surfaces slightly pubescent; petiole .5 to 1 in. long, villous. *Peduncles* 4, from the penultimate axils, 4 in. long, villous; inflorescence 12- to 18-flowered, lax, pubescent; bracts hardly .125 in. long, linear. *Calyx* .125 in. long. *Corolla* .75 in. long, white, nearly straight, but the pedicels bent close under the calyx, so as to bring the corollas horizontal.

PERAK: Ulu Batang Padang, *Wray* 1599; *Scortechini*.

4. *CARDANTHERA*, Voigt.

Herbs. *Leaves* opposite; upper toothed, rarely entire; lower frequently pinnatifid. *Flowers* in axillary clusters (in non-Malayan species running into terminal inflorescences); bracts and prophylla often obscure or 0. *Sepals* narrow, often unequal. *Corolla* nearly straight; tube shorter than the calyx; limb 2-lipped; lobes contorted in the bud. *Stamens* 4, fertile; anther-cells oblong; pollen globose, small, with numerous striae converging to the poles. *Capsule* sessile, narrow, seed-bearing from the base. *Seeds* 30 to 100, on small, straight, conic, soft funicles, hardly to be called retinacula (*i. e.* curved, rigid, pointed), glabrous or slightly glandular, *i. e.* not clothed with hygroscopic hairs.—**DISTRIB.** Species about 8 in India, 2 in Africa.

This genus should, according to Slater, be placed in the same Subfamily with *Staurogyne*, the pollen being identical in the two genera.

CARDANTHERA TRIFLORA, Voigt Hort. Sub. Calc. 482 (1845). Pubescent, decumbent. *Branches* up to 1 ft. long. *Leaves* ovate, crenate-serrate, the lower (when in water) often pinnatifid. *Flowers* 1 to 3 in the axils; bracts .3 to .35 in. long, obovate; prophylla .25 in. long, oblong. *Sepals* linear, unequal, about as long as the bract. *Corolla* .35 to .5 in. long, purple and white. *Capsule* .25 to .35 in., pubescent; style thinly hairy. C. B. Clarke in Hook. f. Fl. Br. Ind. IV, 405. *Ruellia triflora*,

Roxb. Hort. Beng. 46, and Fl. Ind. III. 52. *Adenosma triflora*, Nees in Wall. Pl. As. Rar. III. 79, and in DC. Prodr. XI. 68; T. Anders. in Journ. Linn. Soc. IX. 454 (1867).

SINGAPORE: *vide* C. B. Clarke (in Hook. f. l. c.).—DISTRIB. Abundant in Bengal, extending to Pegu.

I do not find now in the Kew Herbarium any example of this from Singapore; it is nearly sure to grow in the Malay Peninsula.

5. HYGROPHILA, R. Br.

Herbs, attaining 1 to 5 ft. high, more or less hairy. *Stems* quadrangular. *Leaves* opposite, equal, entire or crenate; the upper surface full of raphides. *Flowers* in continuous spikes or axillary clusters. *Calyx* .25 to .5 in. long, with 5 acute teeth, the lower half tubular in the bud, often with 5 lines of very thin tissue, and split deeply in the fruit; or 4-fid in *H. spinosa*. *Corolla* distinctly 2-lipped; lower lip trifold, the middle segment broader, emarginate. *Stamens* 4, didynamous, subsimilar, fertile (except in *H. polysperma*, where the two lower are filaments only or nearly obsolete); filaments glabrous or nearly so; anthers of two parallel subequal mucous cells; pollen globose, 15 to 35 μ in diam., with 12 to 18 longitudinal ribs. *Ovary* oblong, with 8 to 80 ovules; upper part of ovary and style more or less hairy; style with one linear branch, the other reduced to a small rudiment. *Capsule* .25 to .5 in. long, linear-oblong, seed-bearing from the base; seeds 8 to 80, ovoid, flat, 50 μ in diam., brown, nearly smooth on faces, shaggy, with hygroscopic hairs on margin.—DISTRIB. Species 40, in the warmer parts of the globe; these fall into three well-marked subgenera, the species of each of which are so closely allied as to be esteemed subspecies only by some competent botanists.

Subgenus 1. HEMIADELPHIS (genus), Nees. Unarmed. Flowers in terminal spikes:—

Fertile stamens 2:—

Bracts oblong or elliptic, as long as the calyx .. 1. *H. polysperma*.

Subgenus 2. EUHYGROPHILA. Unarmed. Flowers in distant axillary clusters:—

Leaves lanceolate acute or linear:—

Flowers in dense axillary clusters 2. *H. angustifolia*.

Axillary clusters small, often 3- to 1-flowered 3. *H. saxatilis*.

Leaves obovate or oblong, triangular or obtuse at tip:—

Leaves oblong, all sessile or nearly so 7. *H. subsessilis*.

Leaves, or at least lower leaves, petioled:—

Corolla .25 to .35 in. long 5. *H. meianthos*.

Corolla .5 to .8 in. long:—

Capsule .75 to .8 in. long. Calyx sparingly hispid .. 4. *H. quadrivalvis*.

Capsule .7 in. long. Calyx densely hispid .. 6. *H. phlomoidea*.

Subgenus 3. *ASTERACANTHA* (genus), Nees. Each whorl of axillary flowers with some strong spines, often an inch long, round it:—

Leaves sessile. Corolla 1 in. long 8. *H. spinosa*.

1. *HYGROPHILA POLYSPERMA*, T. Anders. in Journ. Linn. Soc. IX. 456 (1867). Small, procumbent, divided, sparingly pubescent. *Leaves* 1 by .5 in., oblong or elliptic, nearly entire; base narrowed or shortly petioled; upper surface full of raphides. *Spikes* terminal, 1 to 2.5 in. long, rather dense; bracts .25 to .35 in., elliptic; prophylla .25 in., lanceolate. *Calyx* .25 in., divided nearly to the base: segments 5, linear, pubescent. *Corolla* .35 in. long, slender, pubescent, pale blue or white. *Stamens* 2; the two posticous filaments without anthers, sometimes nearly obsolete; anther-cells 2, oblong; pollen 25 μ in diam., globose, with 12 to 16 longitudinal ribs. *Ovary* hairy towards the top; style hairy; stigma of one linear and one suppressed branch. *Capsule* .25 to .35 in. long, oblong, hairy towards the top. *Seeds* 20 to 32, orbicular, 40 to 50 μ in diam., flattened, brown, shaggy on the margin with hygroscopic hairs. Boiss. Fl. Orient. IV. 519; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 406; Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 297; Prain Beng. Plants 801. *Justicia polysperma*, Roxb. Hort. Beng. 3, and Fl. Ind. I. 119. *Hemiadelphis polysperma*, Nees in Wall. Pl. As. Rar. III. 80, and in DC. Prodr. XI. 80; Wight Ill. t. 164 B, fig. 3, and Ic. t. 1492; Griff. Notul. IV. 135; Miq. Fl. Ind. Bat. II. 776.

MALACCA: *Griffith*.—**DISTRIB.** Common throughout India; Kabul; Tonkin.

2. *HYGROPHILA ANGUSTIFOLIA*, R. Brown Prodr. 479 (1810). *Stems* 2 ft. high, often decumbent at base. *Leaves* .3 by .7 in., lanceolate, attenuate at either end, subentire, glabrate; upper surface with many raphides; petiole .25 in., sometimes .5 in. long. *Flowers* in distant axillary dense clusters; bract .25 to .35 in. long, elliptic; prophylla scarcely .25 in. long. *Calyx* .35 to .5 in. long; lobes in flower hardly half as long as the tube, triangular-linear, densely clothed with conspicuous raphides, sparsely hispid or nearly glabrous. *Corolla* .5 to .7 in. long, pale purple. *Stamens* 4, fertile; anther-cells 2, oblong, mucous, at equal height; filaments glabrous; pollen 25 μ in diam., globose, with 12 to 16 longitudinal ribs. *Style* hairy; stigma of the genus. *Capsule* .5 to .7 in. long, a little exceeding the calyx, 20- to 28-seeded. Nees in DC. Prodr. XI. 91; Benth. Fl. Austral. V. 545; Ridley in Trans. Linn. Soc. ser. 2, III. 333 (1893). *H. salicifolia*, Nees in Wall. Pl. As. Rar. III. 81, and in DC. Prodr. XI. 92; Wight

Ic. t. 1490; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 407; Hemsl. in Journ. Linn. Soc. XXVI. 237 (1890); Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 297; Ridley in Journ. As. Soc. Straits 121 (Singapore 1900); Prain Beng. Plants 801. *H. lancea*, Miq. in Ann. Mus. Bot. Lugd.-Bat. II. 123 (1865-66). *Ruellia salicifolia*, Vahl. Symb. III. 84; Roxb. Fl. Ind. III. 50.

SELANGOR: *Curtis* 2365. PAHANG: *Ridley* 1213. PEKAN and KELANTAN: fide *Ridley*.—DISTRIB. From South India to China and Japan.

The description above is taken from Wall. Cat. 2373 A, which is Nees' "type" of *Hygrophila salicifolia*. The Selangor example differs from this in having the capsules .8 in. long, in which point it resembles *H. quadrivalvis*, Nees, below. T. Anderson esteemed the whole of the species in the present section to constitute but one polymorphic species (Journ. Linn. Soc. IX. 456 (1867)). They are described here shortly only, with reference to their differences from *H. salicifolia*, Nees, taken as the standard form.

3. *HYGROPHILA SAXATILIS*, Ridley in Trans. Linn. Soc. ser. 2, III. 333 (1893). Small, rigid, branched, 6 to 14 in. high. *Leaves* approximated, 1 to 1.5 by .175 to .2 in., linear, entire, nearly glabrous. *Flowers* in small axillary clusters, usually only 3 to 1 together. *Corolla* .35 to .5 in. long, hardly smaller than that of *H. salicifolia*, white without, violet within. *H. pusilla*, Blume Bijdr. 804?

PAHANG: *Ridley* 2179. PERAK: *Scortechini*; alt. 300 ft.; *Wray* 3319, 3489; *Curtis*.—DISTRIB. Ceylon (Thwaites 3109); Borneo; Philippines.

4. *HYGROPHILA QUADRIVALVIS*, Nees in Wall. Pl. As. Rar. III. 80 (1832). *Stems* stout, often 3 to 4 ft. long. *Leaves* with an obovate triangular or obtuse tip; obovate rather than lanceolate, often crenulated in the upper half. *Calyx* exactly as of *H. salicifolia*. *Corolla* .7 to .8 in. long. *Capsule* .75 to .8 in. long, often numerous in the whorl, very erect. Nees in DC. Prodr. XI. 89; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 408; Ridley in Journ. As. Soc. Straits 121 (Singapore 1900); Prain Beng. Plants 801, 802. *H. obovata*, Wight Ic. t. 1489.

PENANG: *Deschamps*; *Curtis* 1757; Durian S.B., *King's Collector* 368 (flowers white). MALACCA: *Griffith*; *Maingay* 1979 (Kew 1178). SINGAPORE: *Lobb* 57; *Kurz*; *Hullett* 231. PERAK: *Scortechini* 64, 84, in salt swamps; *Wray* 2506; Mekong, *Scortechini* 1099; Durian S.B., *King's Collector* 364.—DISTRIB. India, common, especially near the sea; Java, Borneo, Tonkin.

5. *HYGROPHILA MEIANTHOS*, C. B. Clarke, n. sp. *Leaves* obovate, 2 in. long, nearly glabrous. *Bract* less than .25 in. long, oblong. *Calyx*

·25 in. long, divided half-way down; teeth sparsely white-hispid. *Corolla* (expanded) ·25 to ·35 in. long. *Anthers* small, round. *Capsule* scarcely ·35 in. long. *H. salicifolia* var. *assurgens*. C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 407 (*partly*).

MALACCA: *Maingay* 3002 (K.D. 1177).

The examples are good with numerous flowers and ripe fruits, and appear "normal" in all respects.

6. *HYGROPHILA PHLOMOIDES*, Nees in Wall. Pl. As. Rar. III. 80 (1832). *Stems* often very hairy. *Leaves* 2 to 4 in. long, obovate; tip triangular, rarely subacute. *Calyx* divided half-way down; teeth densely white-hispid, so that the whorls resemble somewhat those of *Phlomis*; otherwise as *H. quadrivalvis*. Miq. Fl. Ind. Bat. II. 779. *H. phlomoides*, Nees in DC. Prodr. XI. 90; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 408; Prain Beng. Plants 801, 802. *H. hirsuta*, Roxb. Fl. Ind. III. 51. *H. phlomoides*, Wall. Cat. 2376.—Rheede Hort. Mal. II. 89, t. 46.

PENANG: *Deschamps*. SINGAPORE: *Ridley* 3612A. SELANGOR: *Ridley* 8547, 10499. PERAK: *Scortechini* 620, 1106, alt. 200 ft.; *Wray* 1748, 2432.—DISTRIB. India (common), Tonkin, Borneo.

VAR. β *Roxburghii*, C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 408. Smaller, often procumbent and more divided. *Leaves* 1 to 2 in. long, often scabrid, pubescent. Prain Beng. Plants 801, 802. *H. obovata*, Griff. Notul. IV. 134 (*not exactly that of Nees*). *Ruellia obovata*, Roxb. Fl. Ind. III. 51.

PENANG: *Deschamps*.—DISTRIB. Chittagong, Pegu, Mergui, Philippines.

I do not see how this var. differs from *H. radicans*, Nees in Wall. Pl. As. Rar. III. 81, and in DC. Prodr. XI. 92.

7. *HYGROPHILA SUBSESSILIS*, C. B. Clarke, n. sp. *Stem, leaves* and *inflorescence* with brown hairs. *Leaves* 1·5 by ·4 in., oblong, obscurely obovate; tip triangular; base narrowed; nerves beneath conspicuous; petiole, even in the lower leaves, 0 or hardly any; otherwise as *H. salicifolia*.

MALACCA: *Harvey*.

This resembles some forms of *H. undulata*, Blume, in which, however, the brown hairs are not present, and the lower leaves are petioled.

8. *HYGROPHILA SPINOSA*, T. Anders. in Thwaites Enum. Pl. Zeyl. 225 (1864). *Stems* stout, 2 to 5 ft. high. *Leaves* 3 to 6 in. long, lan-

ceolate to linear, hispid, sessile. *Flowers* clustered in the axils, 4 to 6 of the outer bracts being strong spines an inch long. *Bract* .5 to 1 in. long, lanceolate. *Calyx* .35 to .5 in. long, divided nearly to the base into 4 lanceolate lobes, one of which is broader and sometimes emarginate. *Corolla* 1 in. long, pale purple. *Anthers* and pollen of the genus. *Capsule* .35 in. long, linear-oblong, 4- to 8-seeded from the base. C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 409; Burkill in Dyer Fl. Trop. Afr. V. 31; C. B. Clarke in Dyer Fl. Cap. V. 11 (*with all syn.*); Prain Beng. Plants 802; *H. longifolia*, Kurz in Journ. As. Soc. Beng. 1870, II. 78 (*non* Nees). *Asteracantha longifolia*, Nees in Wall. Fl. As. Rar. III. 80, and in DC. Prodr. XI. 247; Wight Ic. t. 449; Miq. Fl. Ind. Bat. II. 811; Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 297. *A. auriculata*, Nees in DC. l. c. 248.

SINGAPORE: *King's Collector* 249.—DISTRIB. Abundant in India and Africa.

Hygrophila longifolia, Nees (in Mart. Fl. Brasil, IX. 22 (1847)), is a totally different plant; for this cause T. Anderson, when he transferred *Asteracantha longifolia* to *Hygrophila*, gave it the new name *H. spinosa*. Nevertheless, some botanists call the Asiatic *Asteracantha* by the name *H. longifolia*, thereby causing great confusion.

6. NOMAPHILA, Blume.

Inflorescence in numerous 1-sided, open, axillary racemes shorter than the leaves. *Bract* (and prophylla) inconspicuous, linear, or wanting. *Calyx* even in the bud deeply divided (two-thirds or three-fourths of the way down) into 5 lobes. Otherwise as *Hygrophila*.—Species 14, viz. 8 in South-east Asia, very closely allied, and 6 in Tropical Africa.

This genus is in essentials *Hygrophila*, and is sunk in *Hygrophila* by both Lindau and Burkill, but is easily distinguished from it, whether estimated a genus or a subgenus.

1. *NOMAPHILA STRICTA*, Nees in DC. Prodr. XI. 84 (1847). Nearly glabrous, drying a black-green. *Stems* 3 ft. *Leaves*: blade 3 to 4.5 in. long, narrowly elliptic, attenuate at either end; midrib beneath with fine patent hairs; petioles up to 2 to 3 in. long. *Corymbs* in many axils, 2 to 4 in. in diam., recurved in fruit; peduncles less than 1 in. long; pedicels nearly glabrous; bract and prophylla linear, inconspicuous or 0. *Calyx* .25 to .35 in. long, divided nearly to the base; segments 5, linear, glabrous or minutely scabrous or hispid (not viscid or glandular-hairy). *Corolla* .5 in. long or more, bright blue. *Filaments* glabrous; pollen 20 μ in diam., globose, with 12 to 16 longitudinal ribs. *Ovary* and style pubescent. *Capsule* .35 to .6 in. long;

seeds small, ovoid, flattened, brown, shaggy on the margin, with hygroscopic hairs. C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 409. *Justicia stricta*, Vahl Symb. II. 6. *Cryptophragmium avillare*, Nees in DC. Prodr. XI. 96, cf. Vidal Phanerog. Cuming. Philipp. 61 *in nota*, 132. *Hygrophila stricta*, Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 297 (*non Hassk.*).

PERAK: *King's Collector* 367; *Curtis* 3152; *Wray* 4256; *Scortechini*. JOHORE: *Ridley* 4173, 11133.—DISTRIB. Borneo, Philippines.

Nees himself, in DC. Prodr. XI. 722, united this species to *N. corymbosa*, Blume Bijdr. 804 (1825); the latter is (when dried) a smoky grey-green; the pedicels and calyx have viscous (and often glandular) hairs. The two are very close together.

2. *NOMAPHILA MINOR*, C. B. Clarke, n. sp. Smaller in all its parts than *N. stricta*. *Leaves*: lamina scarcely 2 in. long. *Corymb*-branches slender, glabrate. *Corolla* .25 to .35 in. long. *Anthers* and pollen smaller. *Capsule* .25 to .35 in. long. *N. stricta* (*partim*), C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 409. *Ruellia*? *paniculata*, Herb. Rottler.

PERAK: *Scortechini* 1374.—The example in Herb. Rottler is without locality.

7. RUELLIA, Linn.

Herbs or undershrubs. *Leaves* opposite, subequal, entire; upper surface with raphides. *Flowers* axillary (or panicled in American species); bract 0; prophylla spatulate or subfoliaceous, exceeding the calyx. *Calyx* deeply 5-fid; segments subequal, linear. *Corolla* tubular-ventricose, blue to white; lobes rounded, twisted to the left in the bud. *Stamens* 4, didynamous; filaments glabrous; anthers of 2 oblong, subequal, parallel, muticous, glabrous cells; pollen globose, large (30 to 50 μ in diam.), honeycombed. *Ovary* glabrous; ovules 3 to 10 in each cell; style hairy, with one linear branch, the other obsolete. *Capsule* clavate; base solid, sterile; top ellipsoid or subglobose, with 6 or more close-packed seeds; retinacula large, hooked. *Seeds* ovoid, flattened, hygroscopically shaggy on margin.—Species 150 (Bentham) or 200 (Lindau), in the warmer parts of the world, more abundant in America.

But a considerable number of the species reckoned in *Ruellia* by Lindau have not "wabenpollen" (honeycombed pollen), but "stachelpollen" (prickly pollen); so that the species left in *Ruellia* may not be more than 120 to 150, and possibly may be much fewer, if (as in the above diagnosis) the genus is restricted to those plants which have a stalked clavate capsule [*Dipteracanthus* (genus), Nees].

1. *RUELLIA REPENS*, Linn. Mant. 89 (1767) (*not of Burm.*). Sparingly hairy or glabrate. *Stem* 6 to 20 in., weak, often much branched.

Leaves 1 by .35 to .5 in., lanceolate, nearly always narrowed at the base, entire; upper surface sprinkled with raphides; petiole .125 to .2 in. *Flowers* axillary, mostly solitary; bract 0; prophylla spatulate or foliaceous, exceeding the calyx. *Calyx* .2 in. long, divided nearly to the base into 5 subequal linear segments. *Corolla* .75 in. long. *Capsule* .5 in. long, contracted, sterile at the base; the seeds (usually 5 to 8) imbricated near the top. Blume Bijdr. 794; T. Anders. in Journ. Linn. Soc. IX. 460 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 412; Ridley in Trans. Linn. Soc. ser. 2, III. 332 (1893); Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 310; Hemsl. in Journ. Linn. Soc. XXVI. 238 (1890); Ridley in Journ. As. Soc. Straits, 121 (Singapore 1900). *Dipteracanthus lanceolatus*, Nees in Wall. Pl. As. Rar. III. 82, and in DC. Prodr. XI. 124; Miq. Fl. Ind. Bat. II. 782. *D. subdenticulatus*, Miq.! Journ. Bot. Néerl. I. 117 (1861). *Rostellularia sarmentosa*, herb. Buitenz. ! (non Nees).

PENANG: *Curtis* 1876. MALACCA: *Griffith*. SINGAPORE: *Lobb*; *T. Anderson*; *Hullett*; *Ridley* 2698, 10725. KEDAH: *Ridley* 5750. PAHANG: fide *Ridley*. PERAK: *Scortechini* 1283.—DISTRIB. A common Malay plant, extending to Tenasserim on one side, to China and the Philippines on the other.

The plate of Burmann (Fl. Ind. t. 41, fig. 1) is good, and represents a plant not of the genus *Ruellia*. In the Addit. to Mant. 515 (1771), Linnæus says his *Ruellia repens* was Burmann, t. 41, fig. 1; it may be more correct to call this species *R. repens*, Blume. Nees, in DC. Prodr. XI. 370, says his *Rostellularia sarmentosa* had the capsule "4-seeded from the base," so that there is probably some error in the *Rostellularia sarmentosa* issued from Buitenzorg.

VAR. *β linearis*, C. B. Clarke. *Leaves* 2.25 by .2 to .25 in.

PAHANG: *Ridley* 2182. IPOH: *Deschamps*.

Ruellia prostrata, Lam. Encycl. VI. 349 (cf. Hook. f. Fl. Br. Ind. IV. 411), differs a little from *R. repens*, Linn., by having larger flowers and capsules, and the leaves usually rather larger. In the Kedah example, *Ridley*, n. 5750, the flowers are more than 1 in. long, and the capsules more than .75 in. long; and *Ridley* has issued it as "*R. prostrata*"; the habit and small leaves are typical *R. repens*.

[*R. angustiflora*, Benth. & Hook. f. Gen. Pl. II. 1079 (*R. angustifolia*, Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 311), is a large-flowered American *Ruellia*, which appears to spread from gardens in Malaya; it was collected in Penang by *Stoliczka*, in Singapore by *Deschamps* and *Hullett*, n. 176.]

8. APORUELLIA, C. B. Clarke, n. gen.

Pollen with minute prickles or papillæ, or granulated; not honey-combed; otherwise as *Ruellia*.

To *Aporuella* may be referred *Ruellia flagelliformis*, Hemsley; *R. trichotoma*, Nees; *R. acutis*, R. Brown; *R. spiciflora*, Benth.; *R. australis*, R. Brown; *R. Guppyi*, Hemsley; and several other South-east Asian unnamed plants. Whereas all the Hindostan species of *Ruellia* have honeycombed pollen, the species of *Aporuella* come from Malaya, South China, and Australia.

1. *APORUELLIA SUMATRENSIS*, C. B. Clarke, n. sp. Stem 11 in. high, with few or small leaves except at the base. Lower leaves: lamina 5 by 1·5 in., entire, sparsely puberulous; tip obtuse, triangular; base attenuated; upper surface dotted: the raphides obscure; petioles up to 1·5 in. long. Flowers in distant small clusters on long-peduncled spikes. Floral leaves passing into bracts, ovate or obovate, minutely pubescent, very variable in size. Calyx 175 in. long, divided rather more than half-way down; teeth 5, linear. Corolla 35 in. long; tube linear. Stamens 4, didynamous; anthers subsimilar, of two parallel muticous cells; filaments glabrous; pollen small, globose, 25 μ in diam., granular. Style hairy, one branch linear, the other nearly wanting. Capsule 6 in. long, seed-bearing from the base; seeds about 12, ovate, compressed, shaggy, with hygroscopic hairs on the margin.

SUMATRA: R. Moesie, alt. 600 ft., *H. O. Forbes* 2636!

VAR. β *Ridleyi*, C. B. Clarke. Leaves more obovate than in the type, completely rounded at the top; flowers pure white (Ridley).

SELANGOR: Batu Caves, *Ridley* 8213; Kwala Lumpur, *Curtis* 2364.

2. *APORUELLIA AXILLARIS*, C. B. Clarke, n. sp. Branches (seen) 1 foot long, undivided; internodes 2 in. long. Leaves opposite, equal; blade 3·25 by 1·5 in., ovate-triangular, subobtuse, slightly hispidulous, suddenly attenuate at base; petiole 25 in. long. Flowers in clusters of 1 to 3 in the axils, supported by oblong bracts 25 to 35 in. long. Sepals 5, linear, 2 in. long, pubescent. Corolla 8 in. long, narrowly-funnel-shaped. Stamens 4; anther-cells 2, parallel, oblong, obtuse at base; pollen globose, 45 μ in diam., papillose, subechinate. Capsule nearly 5 in. long, stalked, with 7 flattened seeds in the clavate head.

MALAY PENINSULA: Songkah, *Curtis*.

This plant—in habit, leaves, inflorescence, corolla, capsule—simulates the very common *Ruellia prostrata*, Lam., var. *dejecta*; the pollen is unlike.

9. *STENOTHYRSUS*, C. B. Clarke, n. gen.

Inflorescence a terminal, peduncled, compound, many-flowered, nearly glabrous, subbracteate-linear panicle (8 to 12 by 75 in.); otherwise as *Hemigraphis*.

This genus agrees in character very closely with the Tropical African genera *Mellera* and *Paulo-Wilhelmia*, but the habit and hairs are very different.

1. *STENOTHYRSUS RIDLEYI*, C. B. Clarke, n. sp. *Upper leaf*: blade up to 8 by 2 in., obovate-lanceolate, acuminate at either end, acute, nearly glabrous, entire, reticulate, full of raphides; main nerves 12 pair, oblique; petiole 1.5 in. long. *Peduncle* 1 to 4 in.; thyrsus interrupted at base, of 20 to 50 flowers, clustered in very small opposite cymes; bracts inconspicuous, setaceous. *Calyx* .175 in. long; sepals 5, linear, full of raphides. *Corolla* 1 to 1.5 in. long, blue; tube cylindric, narrow-campanulate in the upper half, minutely hairy. *Stamens* 4, subsimilar; filaments glabrous, connected in pairs; anthers long, of 2 linear-oblong cells at equal height, pubescent, minutely 1- to 2-mucronate at the base, connective mucronate at tip; pollen globose, 40 μ in diam., longitudinally 20-ribbed. *Style* thinly hairy, with one oblong-linear and one suppressed branch. *Capsule* (not ripe) narrowly ellipsoid, glabrate, seed-bearing from the base, with eight ovate flattened seeds.

PERAK: Tambun Loh, *Ridley* 9770; Ipoh, limestone rocks, *Curtis* 3149.

Ridley placed this plant close to *Strobilanthes*; the numerous capsules are all 8-seeded. There are, on one sheet, three thyrsi 8 to 12 by 1 in., and one thyrsus reduced (apparently accidentally) to a dense head.

10. *HEMIGRAPHIS*, Nees.

Herbs or undershrubs. *Leaves* opposite, subequal, often crenate, sometimes lobed; upper surface with raphides, which are sometimes altogether obscure. *Flowers* in terminal spikes, or rarely in 1- to 3-flowered small heads on axillary peduncles; bract usually exceeding the calyx, lanceolate or ovate; prophylla linear, short or 0. *Calyx* deeply 5-fid; segments lanceolate-linear or linear, subequal. *Corolla* tubular-campanulate, blue to white; lobes rounded, twisted in the bud. *Stamens* 4, didynamous; anthers of 2 oblong, subequal, parallel, mucous, glabrous cells; filaments glabrous, or the 2 longer with many long hairs; pollen rather large, from short-ellipsoid to oblong-ellipsoid; the 12 to 16 longitudinal ribs reaching to the poles; stopples 2. *Ovary* oblong, with 6 to 12 ovules, usually hairy at tip; style shortly hairy at base; stigma of one elongate and one suppressed lobe. *Capsule* oblong or linear-obovoid, slightly flattened, hardly stalked; seeds 6 to 12, ovoid, flattened, with much hygroscopic hair on the margin.—Species 30 perhaps, in South-east Asia and Polynesia.

To this genus belong *Ruellia repanda*, Linn.; *R. Ravacensis*, Nees; *R. nemorosa*, Zoll.; *R. colorata*, Nees; and, as Benthams says, most of Nees' first section of *Ruellia*.

Sect. 1. Flowers less than .75 in. long, 1 to 3 together in small short-peduncled heads 1. *H. Ridleyi*.

Sect. 2. Flowers less than .75 in. long, in rather loose spikes :—

Sepals softly hairy, tips ligulate-triangular :—

Mature leaves nearly glabrate 2. *H. confinis*.

Mature leaves hairy 3. *H. hirsuta*.

Sepals with linear-subulate white-hispid tips :—

Capsule hardly .25 in. long, nearly terete 4. *H. alternata*.

Capsule more than .25 in. long, obovoid, flattened 5. *H. platycarpus*.

1. *HEMIGRAPHIS RIDLEYI*, C. B. Clarke, n. sp. *Branches* (seen) 1 foot long, rambling or creeping, rooting, scabrid-pubescent with small suberect hairs. *Leaves* in equal opposite pairs; blade 2 by 1 in., ovate-elliptic, acute, crenate; upper surface with few scattered several-celled bristles (few of these bulbous at base), and with many conspicuous raphides; petioles .25 to .35 in. long. *Flowers* 1 to 3 in small heads on axillary peduncles .175 to .25 in. long; bract oblong .35 in. long; bracteoles (prophylla) linear, hardly half as long as the calyx. *Calyx* .175 in. long; sepals lanceolate-linear, with several-celled white hairs. *Corolla* .5 in. long. *Stamens* and anthers of the genus; filaments with long white simple hairs; pollen 60 by 30 μ , with 12 to 16 ribs and two large stopples. *Ovary* oblong, 8-ovulate, glabrous, but hairy at the top. *Style* slightly hairy at the base; one stigmatic branch elongate, the other suppressed. *Capsule* not seen.

PAHANG: *Ridley* 2180 (probably *H. confinis*, *Ridley* in *Trans. Linn. Soc. ser. 2, III. 332* (1893)).

This is allied, in inflorescence and habit, to *Hemigraphis ravacensis* (Nees sub *Ruellia*).

2. *HEMIGRAPHIS CONFINIS*, T. Anders. in *Journ. Linn. Soc. IX. 463* (1867). *Stem* 2 feet, branching, pubescent. *Leaves*: blade up to 4 by 1.7 in., elliptic, narrowed at either end, obscurely crenate, mature a grey-green and nearly glabrous; raphides in the upper surface obscure; petiole .25 in. long. *Spikes* 1 to 2 by .7 in., continuous but rather loose; bract .5 in. long, obovate or elliptic with triangular tip; prophylla linear, hardly half as long as the calyx. *Calyx* .35 in. long, softly hairy; sepals ligulate upwards with triangular tip. *Corolla* .5 in. long. *Stamens* of the genus; filaments nearly glabrous; pollen 50 by 30 μ , with 12 to 16 longitudinal ribs and no stopples. *Ovary* glabrous, except at the tip; style of the genus. *Capsule* .25 in. long, slightly flattened, glabrous except at the tip, 8-seeded nearly from the base. C. B. Clarke in *Hook. f. Fl. Br. Ind. IV. 423*. *Ruellia confinis*, Nees in *DC. Prodr. XI. 148*; *Miq. Fl. Ind. Bat. II. 788*.

MALACCA: *Cuming* 2354; *Griffith* (K.D.) 6188; *Hervey*; *Hullett*; *Maingay* 1754, 3147, (K.D.) 1174.—DISTRIB. Borneo.

3. *HEMIGRAPHIS HIRSUTA*, T. Anders. in Journ. Agri.-Hort. Soc. Ind. N.S. I. 270 (1868). Hairy. *Leaves* (even fully mature) hairy beneath; the upper surface densely clothed by conspicuous raphides; otherwise as *H. confinis*, T. Anders. *Justicia hirsuta*, Vahl Symb. II. 3, Enum. I. 121. *J. brunelloides*, Lam. Illustr. I. 40. *Nelsonia hirsuta*, Roem. & Sch. Syst. I. 172.

MALACCA: *Ridley* 10759.—DISTRIB. Java, Borneo.

This may be esteemed merely a hairy var. of *H. confinis*, but was kept up by T. Anderson. There are several other Malay sp. of *Hemigraphis* very closely allied.

4. *HEMIGRAPHIS ALTERNATA*, T. Anders. in Journ. Linn. Soc. VII. 114 (1864). *Stem* 12 to 18 in., rooting near the base, pubescent. *Leaves*: blade 2.5 by .75 to 1 in., narrowed at either end, obscurely crenate, mature, sparsely hispid-pubescent; upper surface sprinkled with raphides; petiole .25 to .5 in. long. *Spikes* .5 to 1.5 in. long, loose; bract .5 to .7 in. long, oblong subacute, hispid on margins. *Calyx* .35 in. long; sepals lanceolate with linear tips, lower part glabrate, densely covered with raphides; tips with some several-celled white hispid hairs. *Corolla*, *stamens*, *ovary*, as of *H. confinis*, T. Anders. *Capsule* scarcely .25 in. long, very little compressed, not obovoid, with 10 to 12 seeds placed subequally along its whole length, glabrous except at the tip. *Ruellia alternata*, Burm. Fl. Ind. 135 (excluding tab. *Rheedei*). *R. discolor*, Nees in DC. Prodr. XI. 149. *R. Blumeana*, Nees in DC. Prodr. XI. 149; Miq. Fl. Ind. Bat. II. 789 (as to his var. (Zollinger 660) only).

PAHANG: *Ridley* 2183 ("flower white"). JOHORE: *Ridley* 11129.—DISTRIB. Java, Sumatra.

Described from the Nees two types (Zollinger 343, 660) written up by his hand at Kew. Miquel's "*R. Blumeana*" (named by his hand, and the same plant issued as *R. Blumeana* from the Buitenzorg Garden) is *Hemigraphis Decaisneana*, T. Anders., a species that has the capsule hairy to the base, and the leaves tubercular-scabrous.

5. *HEMIGRAPHIS PLATYCARPOS*, C. B. Clarke, n. sp. *Spikes* longer, denser (than in *H. Blumeana*), with broader bracts, more softly hairy, less hispid. *Capsule* exceeding .25 in. long, linear-obovate, much flattened, with 8 seeds, sterile at the base; otherwise as *H. Blumeana*.

PAHANG: *Ridley* 1408. JOHORE: *Ridley* 11128.

11. ENDOPOGON, Nees.

Fertile stamens 2; otherwise as *Strobilanthes*.—Species 20, in South (or East) India, extending to Singapore.

This genus is hardly worth re-establishing as a split-off from *Strobilanthes*, but Lindau has introduced the point of "2 fertile stamens only" into his diagnosis of *Pseudostenosiphonium*; so that it is necessary either to call *Endopogon* a genus or to re-unite both in *Strobilanthes*. *Strobilanthes* is so very large that it is as convenient to treat it under 4 genera as under 4 subgenera.

1. ENDOPOGON RIDLEYI, C. B. Clarke, n. sp. Puberulous. *Leaves* opposite, unequal, up to 6 by 2 in., elliptic, acuminate at either end, subentire; upper surface with scattered raphides; petioles up to 1 in. long. *Peduncles* 0 to .7 in. long, one from each axil (i.e. in opposite unequal pairs), each carrying one green strobilate spike, pendent in flower, 1 to 1.5 in. long; bracts .75 in. long, elliptic, acute, almost papery, loosely but closely imbricate, adnate at the base. *Flowers* 2, sessile, under each bract, without prophylla. *Calyx* .125 in. long, 5-fid to the base; sepals pubescent, 2 lanceolate-linear, 3 linear. *Corolla* .25 in. long in the bud (perhaps not much longer when expanded), white. *Stamens* 2, fertile; filaments glabrous; pollen 60 by 40 μ , longitudinally ribbed. *Ovary* (and style) glabrous, with 2 ovules in each cell.

SINGAPORE: Stagmount, *Ridley* 5987, 11255.

Allied to *S. adnatus*, C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 436, which is an *Endopogon*.

12. STROBILANTHES, Blume.

Herbs or undershrubs. *Leaves* opposite, often very unequal, sometimes falsely alternate, crenate serrate or subentire; the upper surface usually full of raphides. *Inflorescence* various; the flowers often in heads or strobilate, sometimes solitary in lax panicles, sometimes in small clusters which are paniced; floral leaves prominent or small, persistent or caducous, often passing into true bracts ("deckblaetter") in the upper part of a spike; bracteoles (prophylla) 2, often similar to the sepals, or wanting (but in the axil of a bracteole a bud is sometimes to be found). *Calyx* of 5 (usually rather large) segments, subequal, divided nearly to the base in the Malay species. *Corolla* tubular-campanulate; lobes rounded, twisted in the bud. *Stamens* (fertile) 4, didynamous; anther-cells 2, muticous; pollen large, ellipsoid (rarely subglobose), with 16 to 20 (rarely few) longitudinal ribs and 2 stopples. *Ovary* oblong or ellipsoid with 2 ovules in each cell, sometimes stalked; style with one long branch, the other suppressed. *Capsule* oblong or

narrow-ellipsoid, short-stalked, 4-seeded, or in many species with only 2 seeds.—Species about 200, *i.e.* after the genera *Endopogon*, Nees, *Pseudostenosiphonium*, Lindau, and *Acanthopale*, C. B. Clarke, have been taken out; extending from warmer Africa to China and Australia.

Sect. 1. Heads capitate, occluded (except the corollas) between two erect persistent bract-like floral leaves:—

- | | | |
|---|-------|-----------------------------|
| Leaves scarcely hairy; bracts obtuse | .. .. | 1. <i>S. Maingayi</i> . |
| Leaves pubescent; bracts produced in a strongly crenulate tip | .. .. | 2. <i>S. vibracteatus</i> . |
| Leaves rufous-ciliate on margins; bracts with some rufous hairs | .. .. | 3. <i>S. hirtisepalus</i> . |

Sect. 2. Flowers strobilate or in short heads, with conspicuous rufous hair:—

- | | | |
|---|-------|---------------------------------|
| Heads ovoid, .1 in. long; bracts .5 in. long, linear | .. .. | 4. <i>S. rufo-sepalus</i> . |
| Heads strobilate, 2.25 in. long; bracts .7 in. long, spatulate-oblong | .. .. | 5. <i>S. rufo-strobilatus</i> . |
| Heads capitate, 1.5 in. long; bracts .75 in. long, linear | .. .. | 6. <i>S. rufo-capitatus</i> . |
| Heads 2- to 3-flowered, very small; bracts .25 to 1 in. long, spatulate | .. .. | 7. <i>S. rufo-pauper</i> . |
| Sect. 3. Flowers strobilate, with grey hairs | .. .. | 8. <i>S. Dyerianus</i> . |

Sect. 4. Flowers paniced; bracts caducous or inconspicuous:—

- | | | |
|---|-------|------------------------------|
| Panicle 8 by 5 in.; the flowers in opposite distant parts | .. .. | 9. <i>S. collinus</i> . |
| Panicle 6 by 1 in.; branches scarcely .25 in. long | .. .. | 10. <i>S. pachyphyllus</i> . |

1. STROBILANTHES MAINGAYI, C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 448 (1884). Perennial, 2 to 4 ft. high, sparingly pubescent. *Leaves* opposite, often very unequal, the larger 3 by 1 to 1.25 in., crenulate, tip acuminate; midrib beneath minutely scabrid; surface beneath often microscopically furfuraceo-puberulous, rarely at all hairy; petiole .125 to .25 in., pubescent. *Flowers* 1 to 5, capitate, in an ovoid subsessile head enclosed by two ovate erect floral bract-like leaves; bract 1 by .25 in., quadrate-oblong, keeled, tip rather wide, subobtuse, crenate; prophylla similar to sepals. *Sepals* .4 in. long, glabrous, oblong-subacute, membranous. *Corolla* 2 in. long, white (so noted on several collections); tube long, narrow, funnel-shaped, linear at base. *Stamens* 4, fertile, subsimilar; anthers oblong; filaments glabrous, except sometimes 2 or 3 hairs close to the base; pollen ellipsoid, large (70 by 40 μ), with 12 to 16 longitudinal ribs and 2 stopples. *Style* with a few scattered hairs. *Capsule* (not seen in the type examples) oblong, .5 in. long, with 4 seeds, shaggy all over with hygroscopic hairs.

PENANG: *Maingay* (K.D.) 1182; alt. 1800 to 2000 ft., *Ridley* 7167; *King's Collector* 1545, 1791. KEDAH: *Curtis* 298. PERAK: 3000 to 4000 ft., *King's Collector* 8316. SELANGOR: *Kelsall* 2004.

The "type" of *S. Maingayi* (K.D. 1182) has supplied neither flower nor fruit; the above description is taken largely from Curtis 298. In King's Collector 1545, the collector notes "flowers dark blue, white inside"; but I can find no difference between this n. 1545 and n. 1791 (noted as having white flowers) collected by the same collector in the same locality.

2. *STROBILANTHES BIBRACTEATUS*, Blume Bijdr. 799 (1825). Rather more pubescent than *S. Maingayi*. Leaves often with scattered hairs on the surface beneath. Tips of the bracts produced, conspicuously toothed. Filaments, in their whole lower half, with long, deflexed several-celled hairs; otherwise as *S. Maingayi*. Miq. Fl. Ind. Bat. II. 801. *Goldfussia bibracteata*, Nees in DC. Prodr. XI. 174. *Dicliptera ? crenata*, Miq. Fl. Ind. Bat. II. 844.

PERAK: Maxwell's Hill, Ridley 5516; Wray 174, 1674; Scortechini 337, 1413.—DISTRIB. Java, Sumatra.

There is another closely allied plant collected in Sumatra (Forbes 1906), which differs little but by having the flowers "pale purplish blue." *S. erosus*, Nees in DC. Prodr. XI. 181, appears to be this species, as Nees suspected; but I have seen no authentic example of *S. erosus*.

3. *STROBILANTHES HIRTISEPALUS*, C. B. Clarke, n. sp. More hairy than *S. bibracteatus*. Leaves minutely rufous-hairy on the margins. Floral leaves (involucral bracts) with rufous hairs. Sepals linear, very hairy, with rufous several-celled hairs. Otherwise as *S. bibracteatus*.

PERAK: Larut, alt. 1000 to 1500 ft., King's Collector 2215; Scortechini 940.

4. *STROBILANTHES RUFO-SEPALUS*, C. B. Clarke, n. sp. Branches 18 in. long, rufous-hairy, procumbent, divided, rooting near the base. Leaves opposite, one about twice as long as the other, longer one 2.25 by .25 in.; elliptic-acuminate, crenate, sparsely hispid on the upper surface; raphides obscure; petiole .2 in. long. Heads 1 in. long, ovoid, few-flowered, terminal and axillary. Bracts linear, .5 in. long, with several-celled bright-rufous hairs. Sepals .35 in. long, linear-subulate, with several-celled bright-rufous hairs in the upper half. Corolla 1 in. long; tube campanulate from a short linear base. Stamens 4; longer filaments hairy in their lower half; pollen 50 by 30 μ , longitudinally ribbed. Style glabrous, except close to the apex of capsule. Capsule .35 in. long, glabrate, with 4 young seeds.

PENANG: alt. 2000 ft., Ridley & Curtis 2761. PERAK: Scortechini; Ipoh, Curtis.

This species is near *Strobilanthes anamiticus*, O. Kuntze Revisio, I. 498 (1891).

5. *STROBILANTHES RUFO-STROBILATUS*, C. B. Clarke, n. sp. Branches rufous-hairy, creeping, rooting at the base. *Leaves* opposite, nearly equal, 4 by 2 in., cuneate at either end, crenate, nearly glabrate on the upper surface; petiole .5 in. long. *Heads* strobilate, 2 to 2.5 in. long; bracts (floral leaves) prominent even to the top of the head, .7 by .25 in., narrowed at either end; bracts .5 in. long, linear-spathulate, densely rufous with several-celled hairs. *Sepals* .4 in. long, linear, rufous-hairy. *Corolla* 1.25 in. long; tube campanulate, curved; lobes "purple" (Scortechini). *Stamens* 4; filaments hairy. *Ovary* pubescent at the apex, 4-ovulate; pollen 70 by 40 μ , longitudinally multi-striate.

PERAK: *Scortechini* 225.

6. *STROBILANTHES RUFO-CAPITATUS*, C. B. Clarke, n. sp. "Shrubby creeper, 6 to 8 ft. long." *Branches* rufous-hairy. *Leaves* subequal or very unequal, up to 8 by 3.5 in., cuneate at either end, crenate; upper surface nearly glabrate; petioles .35 in. long. *Heads* sessile or peduncled, 1 to 2 in. long, densely clothed with bright rufous several-celled long hairs; bracts (floral leaves) .75 by .125 in., linear, shaggy on the margin, with rufous hairs .125 in. long; bracts .25 to .35 in. long; rufous-hairy; sepals linear, .25 in. long, rufous-hairy. "*Corolla* white."

PERAK: alt. 2500 to 3000 ft., *King's Collector* 10935; *Scortechini* 568.

7. *STROBILANTHES RUFO-PAUPER*, C. B. Clarke, n. sp. Slender, procumbent, rooting at the nodes, pubescent. *Leaves* opposite, more or less unequal, up to 2 by .7 in., elliptic-lanceolate, crenate; upper surface nearly glabrous; petioles .125 to .25 in. long. *Heads* very small, 2- to 3-flowered; bracts (floral leaves) .25 to 1 in. long, very narrowly spatulate, sparingly or obscurely hairy; bracts .25 in. long, linear, more or less rufous-hairy. *Calyx* .2 in. long; sepals linear, pubescent, with long several-celled straight rufous hairs at the tips. *Corolla* 1 in. long, "blue" (Ridley), nearly straight, narrow-funnel-shaped. *Stamens* 4; filaments glabrous; pollen 70 by 40 μ , longitudinally ribbed. *Ovary* and style glabrous. *Capsule* with 4 hairy seeds.

PERAK: Maxwell's Hill, alt. 3000 ft., *Wray* 4192; the Cottage, alt. 5000 ft., *Ridley* 5515.

8. *STROBILANTHES DYERIANUS*, Masters in Gard. Chron. ser. 3, XIII. 442 (1893). Shrubby, vagant. *Leaves* opposite, unequal, sessile; blade of the larger one up to 7 by 3 in., elliptic-lanceolate, subacute, crenulate, nearly glabrate, often auricled at the base. *Peduncles* axillary, 1 to 3 in. long, with scattered, small, ovate leaves (.75 in. long), each terminated by a strobilate spike 1 to 2 in. long, pubescent (without rufous hair). *Bracts* .25 to .35 in. long, round-obovate. *Corolla* 1.3 in. long, violet-blue, *Stamens* 4; filaments glabrous; anther-cells short-oblong;

pollen 50 μ long, 30 μ broad, with 12 to 14 strong longitudinal striations. Kew Bull. 1894, Append. II. 51; Hook. Bot. Mag. t. 7574.

PENANG: *Curtis*.

This may not be indigenous in the Malay Peninsula. A note of Curtis says "originally collected in Burma by Boxall."

9. *STROBILANTHES COLLINUS*, Nees in Wall. Pl. As. Rar. III. 86 (1832). Attains 4 ft. *Leaves* opposite, equal, up to 10 by 3 in., elliptic, acuminate at either end, serrate, nearly glabrous, clothed with raphides on both surfaces; petiole hardly 1 in. long. *Panicles* terminal, open, often 8 by 5 in.; the flowers sessile, distant, in opposite pairs along the pubescent branches; bracts narrowly obovate-oblong, obtuse, .75 in. long, early falling. *Sepals* 5, subequal, .25 in. long, linear, hairy. *Corolla* 1.5 in. long, narrow, tubular-campanulate, white tinged pink. *Stamens* 4; filaments hairy; pollen ellipsoid, longitudinally striate. *Ovary* and *style* pubescent. *Capsule* .7 in., linear-oblong, pubescent; seeds 4, hairy. Nees in DC. Prodr. XI. 192; Miq. Fl. Ind. Bat. IV. 801; T. Anders. in Journ. Linn. Soc. IX. 476 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 465. *Ruellia collina*, Wall. Cat. 2343.

SINGAPORE: *Lobb*. PENANG: *Wallich* 2343. PERAK: alt. 2000 ft., *Curtis* 1313; alt. 300 to 800 ft., *King's Collector* 7271, 8490.

10. *STROBILANTHES PACHYPHYLLUS*, C. B. Clarke, n. sp. Shrub, up to 4 ft. high. *Leaves* opposite, equal, 5.5 by 2 in., elliptic, obscurely obovate, acute at either end; under surface pubescent ("silvery grey" when fresh), densely clothed with raphides, obscurely crenate, remarkably thick, hard in texture; petiole 1.5 in. *Panicle* terminal, long-peduncled, 6 by 1 in.; lateral branches scarcely .25 in. long. *Sepals* 5, subequal, .25 in. long, linear, glabrous, full of raphides. *Corolla* 1.25 in. long, very narrowly tubular-campanulate, light-blue. *Stamens* 4; filaments hairy in the lower half; anthers oblong, mucicous; pollen exactly globose, 40 μ in diam., 20-ribbed, 2-stopped. *Style* thinly hairy.

PERAK: hill-top, *Scortechini* 1786; alt. 1600 to 2000 ft., *King's Collector* 7150.

The material represents the species imperfectly; it appears allied to *S. collinus*, Nees; the texture of the leaves is distinctive, and the globose pollen is very unusual in the genus *Strobilanthes*.

13. *ACANTHOPALE*, C. B. Clarke, n. gen.

Pollen globose, echinate, without ribs; otherwise as *Strobilanthes*. Species 8, in tropical Africa with Madagascar; and many Indian.

Among the *Strobilanthes* to be removed to *Acanthopale* are *S. lanceolatus*, Nees; *S. pulneyensis*, C. B. Clarke; *S. Zenkerianus*, T. Anders.; *S. Arnottianus*, Nees;

S. exsertus, C. B. Clarke; *S. ixiocephalus*, Benth.; *S. Gardnerianus*, T. Anders.; *S. vestitus*, Nees; *S. laxus*, T. Anders.; *S. Hookeri*, Nees; *S. Andersonii*, Benth.; *S. bolamputtensis*, Bedd.; *S. acrocephalus*, T. Anders.; *S. radicans*, T. Anders.; *S. debilis*, Hemsl.; *S. divaricatus*, T. Anders.; *S. oliganthus*, Miq.; *S. japonicus*, Miq.

1. ACANTHOPALE? MALASICA, C. B. Clarke, n. sp. *Branch* nearly round, glabrate, at the tip sparsely hairy. *Leaves* opposite, equal; blade 2.5 by 1 to 1.5 in., elliptic-triangular, nearly entire, scarcely pubescent; upper surface with raphides; tip hardly acute; base deltoid; petiole .25 in. long. *Flowers* in poor, axillary, sessile or short-peduncled spikes; floral leaves caducous, not seen; bract .5 in. long, linear-ligulate, glabrous; bracteoles (prophylla) .25 in. long, linear, glabrous. *Sepals* 5, equal, .25 in. long, linear, slightly hairy at the tips. *Corolla* .75 in. long at least, nearly glabrous. *Stamens* 4, perfect; filaments glabrous; anthers oblong, muticous, parallel, at equal height; pollen globose, 50 μ in diam., with bluntish spines, not ribbed. *Ovary* glabrous; style thinly hairy, one branch long, the other suppressed. *Capsule* .7 in. long, with a long sterile base; seeds 4, crowded in the globose head, hygroscopic-shaggy.

KEDAH: Lankawi Island, Ridley 8298.

The doubt as to the genus of this plant arises because the specimen is in such a state that I am not sure that the grain of pollen described may not have been a stray grain.

14. ACANTHUS, Linn.

Harsh glabrous shrubs. *Leaves* often prickly. *Flowers* showy, spiked; bract ovate; prophylla (bracteoles) 2 or 0. *Calyx* 4-partite nearly to the base; 2 inner segments much narrower than the 2 outer, subopposite. *Corolla* strongly 2-lipped; the posticous lip 0, *i. e.* truncated close to the base; anticous lip 3-lobed, nearly flat, blue or white; the mid-lobe bifid. *Stamens* 4, subsimilar; filaments glabrous. *Anthers* 1-celled, oblong, muticous, conspicuously fringed by white hairs; pollen ellipsoid, with 3 narrow longitudinal chinks. *Ovary* with 2 to 4 ovules in each cell. *Capsule* ellipsoid, woody, large, shining brown, 2- (rarely 4-) seeded; seeds discoid, without hairs.—DISTRIB. Species 8 or 10, extending from South Europe and Africa to Polynesia.

Stiff, erect shrubs:—

Corolla 1.25 in. long, blue; prophylla .25 in. long	..	1. <i>A. ilicifolius</i> .
Corolla .75 in. long, white; prophylla 0	..	2. <i>A. ebracteatus</i> .
Twining, subscandent	.. ..	3. <i>A. volubilis</i> .

1. ACANTHUS ILICIFOLIUS, Linn. Sp. Pl. 639 (1753). Shrub with many stout branches, 1 to 5 ft. high. *Leaves* 4 to 7 by 1 to 3 in.,

subpinnatifid, spinous, nearly sessile. *Spikes* 6 by 1·5 in.; bracts ·3 in. long, ovate; prophylla ·25 in. long, triangular-lanceolate. *Calyx-segments*; 2 outer subsimilar, ·5 to ·7 by ·3 in., round-ovate; 2 inner (alternate with the outer) shorter, much narrower. *Corolla* 1·25 in. long or more, blue. *Capsule* 1 by ·5 in.; seeds large, with close brain-like convolutions. Benth. Fl. Austral. IV. 548 (*partly*); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 481 (*with syn.*); Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 319; Hemsl. in Journ. Linn. Soc. XXVI. 242 (1890); Prain Beng. Plants 800.

PENANG: *Deschamps*, King. MALACCA: *Griffith*. SINGAPORE: *Ridley* 8097. PERAK: *Wray* 2494, 2499; *Scortechini*.—DISTRIB. In saline mud, from Africa to Polynesia.

VAR. *β integrifolia*, T. Anders. *Axillary peduncles* numerous, running into large terminal panicles; leaves elongate, lanceolate, entire or nearly so.—DISTRIB. Andamans.

2. ACANTHUS EBRACTEATUS, Vahl Enum. II. 75, t. 40 (1791). *Bracts* caducous; prophylla 0. *Calyx* ·3 in. long. *Corolla* ·75 in. long, white; otherwise as *A. ilicifolius*, Linn. C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 481; Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 319; *Ridley* in Trans. Linn. Soc. ser. 2, III. 332 (1893), and in Journ. As. Soc. Straits 121 (Singapore 1900).

MALACCA: *Griffith*, *Maingay* 3084. PAHANG: *Ridley* 1276.—DISTRIB. Salt marshes, from the Andamans to Cochin-China and Java.

Bentham doubts whether this species is distinct from *A. ilicifolius*, Linn. *Ridley* n. 1276 is a typical example of *A. ebracteatus*, with flowers very much smaller than those of *A. ilicifolius*.

3. ACANTHUS VOLUBILIS, Wall. Pl. As. Rar. II. 56 t. 172 (1831). Twining, unarmed. *Leaves* oblong or elliptic, entire, glabrous. *Spikes* linear-oblong; prophylla 0. *Corolla* white, 1 in. long. Kurz For. Fl. II. 242; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 481; *Ridley* in Journ. As. Soc. Straits 121 (Singapore 1900). *Dilivaria volubilis*, Nees in Wall. Pl. As. Rar. III. 98. *D. scandens*, Nees in DC. Prodr. XI. 269.

PENANG: *Curtis* 510. SINGAPORE: fide *Ridley*.—DISTRIB. Coast of India, Siam, Malaya, Australia.

The dried tips of the branches are difficult to separate from those of *A. ebracteatus*; the leaves are usually entire or slightly prickly; the flowers larger.

15. GYMNSTACHYUM, Nees.

Herbs or undershrubs, sparingly pubescent. *Leaves* lanceolate to obovate, entire or crenulate, petioled. *Panicle* (in the Malay Peninsula

species) terminal, sometimes of several elongate branches; branches linear, with very small lateral cymes, or reduced to spikes; bracts linear, very small; prophylla hardly any. *Calyx* small, less than .2 in. long, divided deeply into 5 linear segments, pubescent or puberulous. *Corolla* .5 to 1 in. long; tube narrow; limb 2-lipped. *Stamens* 2; anther-cells 2, oblong, parallel, at equal height, muticous; pollen small, short-ellipsoid, longitudinally (often obscurely) ribbed. *Ovary* conic, many-ovulate, nearly glabrous; style at tip shortly 2-fid. *Capsule* .5 to 1 in. long, linear, glabrate, with parallel sides, 8- to 20-seeded from the base. *Seeds* ovoid, flattened, obscurely hairy. Species 25 to 30, in South-east Asia, North Australia, Polynesia.

This genus, varying in size, is distinguished by the linear (not clavate) many-seeded capsule. The small-sized group, *Gymnostachyum* proper, has (A) the flowers clustered or opposite (B) the flowers, solitary, alternate; but of the group (A) there is no example from the Malay Peninsula.

Stems 1 to 4 in. long. Flowers solitary in long spikes:—

Spikes linear, simple. Corolla blue, toward the base whitish:—

Leaves suddenly narrowed on the winged petiole .. 1. *G. decurrens*.

Leaves spatulate on the petiole:—

Corolla .75 in. long or more 2. *G. diversifolium*.

Spikes linear, somewhat branched; corolla white .. 3. *G. pallens*.

Stem elongate; panicle with many long, linear branches .. 4. *G. polyneuron*.

Stems 1 to 3 ft. long; inflorescence terminal; bracts minute; stamens, pollen, and style as of *Gymnostachyum*; but the capsule is not known in any of the following species:—

Panicle 2 to 3 in. long, short-peduncled; flowers 8 to 20:—

Spike slender, linear; style hairy 5. *G. simplicicaule*.

Spike denser; style glabrous:—

Leaves with 5 to 6 pairs of nerves 6. *G. hirtistylum*.

Leaves with 9 to 11 pairs of nerves 7. *G. magis-nervatum*.

Panicle 8 in. long, usually branched:—

Leaves not exceeding 2.5 in. in breadth:—

Leaves thick, attenuate at either end 8. *G. knoxifolium*.

Leaves elliptic, shortly acuminate:—

Panicle with long branches 9. *G. ? Scortechinii*.

Panicle linear, with short lateral cymes 10. *G. Ridleyi*.

Leaves 6 in. wide 11. *G. ? magnum*.

1. *GYMNOSTACHYUM DECURRENS*, Stapf in Kew Bull. 357 (1894).
Stem 1 to 4 in. high. Leaves up to 5 by 3 in., pubescent beneath, ovate; tip triangular; margin undulate; nerves 6 pairs, the lowest patent; base suddenly narrowed, often decurrent on the petiole. Spikes

linear, 4 to 7 in. long (5 on one stem); flowers all solitary; bracts minute, linear. *Sepals* hardly .15 in. long, linear, pubescent. *Corolla* .5 to .6 in. long, pubescent, blue. *Stamens* 2; filaments glabrous upwards; anther-cells 2, oblong, parallel at equal height, minutely or obscurely mucronate at base; pollen ellipsoid, 20 μ long, obscurely ribbed longitudinally. *Ovary* minutely pubescent; style thinly hairy, with one branch suppressed. *Capsule* .7 in. long, linear, glabrate, 20-seeded.

PAHANG: *Ridley*.

2. *GYMNOSTACHYUM DIVERSIFOLIUM*, C. B. Clarke, n. sp. Creeping. *Stems* 1 to 4 in. *Leaves* up to 5 by 2.25 in., slightly pubescent beneath, ovate; tip triangular; margin entire; nerves 8 pairs; base suddenly narrowed, shortly decurrent on the petiole, or (on every plant) one leaf truncate or cordate at base. *Spikes* linear, 2 to 5 in. long, 1 to 3 on one stem; flowers all solitary; bracts minute or none. *Calyx* scarcely .15 to .2 in. long. *Corolla* .75 in. long or rather more. Otherwise as *G. decurrens*, Stapf.

KEDAH: *Curtis* 2530. PERAK: alt. 400 to 600 ft., *King's Collector* 8284, 936; *Scortechini* 1589.

In every plant the leaves are decurrent on the petiole; but there are one or two upper leaves truncate or even cordate at base; the same may be observed in several of these small *Gymnostachyum*s. This plant is nearly allied to *G. decurrens*, Stapf; the leaves are of thinner texture, with thinner nerves.

3. *GYMNOSTACHYUM PALLENS*, C. B. Clarke, n. sp. Rhizome 1.5 in. long, woody, nodose. *Stem* .5 to 1 in. long. *Leaves*: blade 4 by 2.5 in., broad-ovate; tip subobtusely, nearly glabrous, shortly decurrent on the petiole; margin wavy-crenate; upper surface densely punctate; lower surface pale green. *Spike* 3 to 4 in. long, on a 3 to 4 in. peduncle, slightly branched, minutely pubescent; flowers solitary. *Calyx* .125 in. long. *Corolla* .5 in. long, white. *Capsule* rather more than .5 in. long.

PERAK: alt. 300 to 500 ft., *King's Collector* 8133.

4. *GYMNOSTACHYUM POLYNEURON*, C. B. Clarke, n. sp. Top of stem leafy, 3 in. long (seen). *Leaves* spatulate; blade ovate, 5 by 2.25 in.; tip triangular-obtusely, nearly glabrous; primary nerves 10 pairs; petioles 1.5 in. long. *Panicle* terminal, compound; ultimate spikes 2 to 5 in. long, linear; flowers distant, solitary, subsessile. *Sepals* .125 in. long, linear, nearly glabrous. *Corolla* .5 in. long; "lower lip deep violet, upper white splashed with violet." *Stamens* 2; anther-cells 2, narrow oblong, at equal height, not tailed; pollen ellipsoid, 30 μ long, with 2 stopples and 2 longitudinal rows on either side of each stopple. *Ovary*

nearly glabrous; style shortly 2-fid, thinly hairy in the lower half. *Capsule* .5 in. long, linear-oblong, glabrate, with 10 seeds.

SIAMESE STATES: Songkah, *Curtis*.

5. *GYMNOSTACHYUM SIMPLICICAULE*, C. B. Clarke, n. sp. Slightly pubescent. *Stem* 1 to 2 ft. long, undivided (in any example seen). *Leaves*: blade 3 by 1 in., elliptic, obtusely triangular at either end, entire; nerves 5 to 6 pairs, obscure; petioles .25 to .5 in. long. *Panicle* terminal, few-flowered, reduced almost to an oblong spike; peduncle hardly 1 in. long; bracts minute. *Sepals* hardly .125 in. long, linear. *Corolla* hardly .5 in. long, grey-yellow, 2-lipped. *Stamens* 2; filaments glabrous; anther-cells 2, narrowly oblong, parallel, nearly at equal height, muticous; pollen 30 by 15 μ , narrowly ellipsoid; stopples 2, longitudinally obscurely ribbed. *Style* upwards glabrous, very shortly bifid at tip.

PERAK: alt. 3000 to 3500 ft., *King's Collector* 893, 935, 2394; *Scortechini* 688.

6. *GYMNOSTACHYUM HIRTISTYLUM*, C. B. Clarke, n. sp. Glabrate, the inflorescence pubescent. *Stems* nearly a foot high, simple, decumbent, rooting at the base. *Leaves* opposite, equal; blade elliptic-acute, 4 by 2 in., without raphides; base broadly cuneate; nerves 6 to 7 pairs; petioles .2 in. long. *Inflorescence* of 2 terminal, simple, linear, slender, interrupted, ebracteate spikes; peduncles .5 to 1 in. long; flower-clusters of 1 to 2 flowers, opposite, the lower pairs distant. *Sepals* hardly .125 in., linear. *Corolla* white, very small, with a short tube. *Stamens* 2; anther-cells 2, at equal height, not tailed; pollen very shortly ellipsoid. *Style* hairy; tip shortly bifid.

PERAK: alt. 400 to 600 ft., *King's Collector* 10814.

7. *GYMNOSTACHYUM MAGIS-NERVATUM*, C. B. Clarke, n. sp. Almost glabrous. *Stem* 12 to 18 in., decumbent, rooting near the base, branched. *Leaves* opposite, equal; blade 3.5 by 1.3 in., elliptic-lanceolate, acuminate at either end; nerves 9 to 11 pairs, oblique; both surfaces with raphides, the lower also densely, minutely dotted; petioles .2 in. long. *Peduncles* terminal, hardly .5 in. long. *Spikes* 2.5 in. long, simple; flowers 12 to 20, opposite; bracts minute. *Sepals* hardly .1 in. long, lanceolate, nearly glabrous. *Corolla* .5 in. long, very narrow, cream-coloured, 2-lipped nearly half-way down. *Stamens* 2; filaments glabrous; anther-cells 2, rather large, oblong, at equal height, muticous; pollen 40 by 25 μ , with 10 strong longitudinal ribs. *Pistil* glabrous; ovules 8 or more.

PERAK: alt. 100 ft., *King's Collector* 6542.

8. *GYMNOSTACHYUM KNOXIFOLIUM*, C. B. Clarke, n. sp. Nearly glabrous, except the minutely pubescent inflorescence. *Stem* erect, with long

internodes. *Leaves*: blade 6.5 by 2 in., broadly lanceolate, tapering at either end, texture thick, without raphides; nerves 7 pairs, springing very obliquely and curving inwards; petioles .25 in. long. *Panicle* of two branches; branch 8 in. long, linear, with small, opposite, distant cymes; bracts hardly .2 in. long, linear. *Sepals* .075 in. long, oblong-linear. *Stamens* 2; filaments glabrous, each with a minute tooth at base; anther-cells narrow-oblong, parallel at equal height, muticous. *Ovary* nearly glabrous, many-ovuled; style thinly hairy; tip minutely 2-fid. Buds very young; corolla noted white by collector.

NEGRI-SEMBILAN: *King's Collector* 10085.

9. *GYMNOSTACHYUM* ? *SCORTECHINII*, C. B. Clarke, n. sp. *Stem* erect, at least 12 to 18 in. high. *Leaves*: blade 7.5 by 2.5 in., elliptic, acuminate at either end, entire; upper surface with raphides; lower minutely pubescent; petioles .5 to 1.5 in. long. *Panicle* very young, 8 in. long, with long branches, many-flowered, rusty-pubescent; bracts inconspicuous; flowers mostly in approximate opposite pairs. *Calyx* .125 in. long. *Stamens* 2; filaments glabrous at top; anther-cells 2, oblong, parallel, at equal height, acute-muticous at base; pollen 35 by 20 μ , with 2 stopples; a longitudinal row of patches (hardly tubercles) on each side of each stopple.

PERAK: *Scortechini*.

The habit of this plant might do for a *Gymnostachyum* near *G. venustum*, T. Anders., but the genus is doubtful.

10. *GYMNOSTACHYUM* *RIDLEYI*, C. B. Clarke, n. sp. A tall shrub. *Leaves*: blade 6 to 7 by 2.25 in., elliptic, shortly cuneate-acuminate at either end, pubescent beneath; petiole .75 in. long, pubescent. *Panicles* (reduced almost to spikes) 2, terminal, 11 by .75 in.; bracts .125 to .2 in. long, linear; flowers distant, solitary, or in 2- to 4-flowered lateral cymes on peduncles hardly .15 in. long. *Sepals* .15 to .2 in. long, pubescent. *Corolla* white.

PERAK: *Ridley* 9772.

The example shows no corolla, no capsule.

11. *GYMNOSTACHYUM* ? *MAGNUM*, C. B. Clarke, n. sp. A shrub. *Stem* glabrate; upper internodes 7 in. long. *Leaves*: blade up to 12 by 6 in., obovate, nearly glabrate, entire; nerves 12 (or more) pairs; upper petioles 3 in. long. *Panicle* terminal, 8 by .75 in.; bracts .15 to .2 in., linear; peduncle 1.5 in. long; small cymes 2- to 3-flowered in opposite approximate pairs. *Sepals* linear, .2 in. long, pubescent. *Corolla* in very young bud. *Stamens* 2; filaments glabrous upwards; anther-cells 2, parallel, oblong, at equal height, muticous.

MALACCA: Waterfall, *Goodenough* 1893.

From the size, habit, and stamens of this plant it is almost certainly either a *Gymnostachyum* or a *Phlogacanthus*.

16. PHLOGACANTHUS, Nees.

Corolla-tube cylindric. *Capsule* narrowly ellipsoid, contracted close to the base; otherwise as *Gymnostachyum*.—DISTRIB. Species 12, in India; 1 or 2 extending a short way east.

1. PHLOGACANTHUS BREVIS, C. B. Clarke, n. sp. A branched under-shrub, 12 to 18 in. long. *Leaves*: blade 6 by 3·5 in., broadly ovate; tip subobtusate; base shortly attenuate; nerves 6 to 7 pairs; petiole 1 to 1·5 in. long. *Panicles* terminal, 2 to 4 in. long, oblong; bracts minute. *Sepals* ·15 to ·2 in. long, linear, minutely pubescent. *Corolla* small (only seen in bud), grey pubescent without. *Stamens* 2; anther-cells 2, oblong, parallel, at equal height, muticous; pollen 20 by 15 μ , longitudinally banded. *Pistil* glabrous. *Capsule* 1 in. long, nearly ·2 in. wide upwards, subcylindric, obtuse, 8-seeded; base narrowed. *Seeds* flat, nearly ·125 in. in diam.

PERAK: alt. 300 ft., King's Collector 2884.

The capsule is here typically that of *Phlogacanthus*, and not the parallel-sided capsule of *Gymnostachyum*; but the two genera may be united.

17. ANDROGRAPHIS, Wallich.

Herbs or very small shrubs. *Leaves* entire. *Racemes* (or spikes) 1-sided, axillary and terminal, often compounded into loose panicles with spreading branches; bract very small, narrow; prophylla hardly any; flowers solitary or in few-flowered, distant clusters. *Sepals* 5, rarely more than ·2 in. long, linear. *Corolla* small (about ·5 in. long), 2-lipped; base tubular; limb white, spotted pink-purple in the palate. *Stamens* 2; filaments hairy; anther-cells 2, ovate, parallel, at nearly equal height; base acute (not spurred), with often a tuft of hairs; pollen 25 μ long, short-ellipsoid, with few very slender longitudinal ribs. *Style* thinly hairy; tip minutely bifid. *Capsule* narrowly oblong, with parallel sides, seed-bearing nearly from the base, flattened from the back of the valves. *Seeds* 6 to 12, stony, cuboid-ellipsoid, smooth, glabrate, with rows of minute pits.—DISTRIB. Species 18, very closely allied, in India; 1 or 2 extending to China and Malaya.

Leaves lanceolate ..	..	..	..	..	1. <i>A. paniculata</i> .
Leaves ovate ..	..	..	..	..	2. <i>A. tenuiflora</i> .

1. ANDROGRAPHIS PANICULATA, Nees in Wall. Pl. As. Rar. III. 116 (1832). An erect annual, 1 to 3 ft. high. *Stem* quadrangular

Leaves 2·5 by ·5 to ·75 in., lanceolate, glabrous, paler beneath; petioles ·25 in. long. *Panicle* copious, of lax divaricate racemes: lower flowers in each raceme pedicelled, solitary. *Capsule* ·75 by ·125 in., nearly glabrous when mature. Nees in DC. Prodr. XI. 515; Wight Ic. t. 518; Miq. Fl. Ind. Bat. II. 855; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 501; Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 323; Prain Beng. Plants 809. *Justicia paniculata*, Burm. Fl. Ind. 9; Blume Bijdr. 788.

PENANG: Curtis 1877.—DISTRIB. Throughout India.

2. *ANDROGRAPHIS TENUIFLORA*, T. Anders. in Journ. Linn. Soc. IX. 502 (1867). *Leaves*: blade ovate, shortly acuminate, 2·5 by 1·5 in., obscurely puberulous; base shortly spathulate. *Racemes* (often nearly spikes) very slender, straggling. *Corolla* ·4 in. long. Otherwise as *A. paniculata*, Nees. Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 323; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 502. *Haplanthus tener*, Nees in Wall. Pl. As. Rar. III. 115, and in DC. Prodr. XI. 512.

KEDAH: Ridley 8331; Curtis 2136, 2578.—DISTRIB. Eastern India, Malaya.

18. *CYSTACANTHUS*, T. Anders.

Shrubs or erect herbs. *Leaves* opposite, equal, entire. *Inflorescence* terminal (or axillary in some non-Malay species); panicles narrow; bracts small; prophylla 0. *Calyx* deeply 5-fid; segments narrow. *Corolla* rather large, tubular, curved and inflated, somewhat 2-lipped; segments ovate or oblong, one completely outside in the bud. *Stamens* 2; rarely 2 rudiments added; anthers of 2 oblong, parallel, mucous cells; connective often hispid on the back; pollen subglobose, with few longitudinal bands. *Ovary* with 4 or more ovules in each cell. *Capsule* linear, with parallel sides, many-seeded nearly from the base.—DISTRIB. Species 5, in India; 1 extending to Cochin-China.

1. *CYSTACANTHUS TURGIDA*, Nicholson Dict. Gard. I. 428 (1884). A glabrous shrub, 1 to 2 ft. high. *Leaves*: blade 4 to 7 in. long, oblong or narrow-elliptic, narrowed at either end; petioles ·5 to 1 in. long. *Inflorescence* terminal; panicles 1 to 5 in. long, dense; flowers clustered on branches hardly ·17 in. long; bracts inconspicuous, ·15 to ·2 in. long. *Calyx*-segments ·125 to ·2 in. long, linear. *Corolla* 1 in. long, white, pink-spotted; tube strongly bent close above the calyx and greatly inflated. *Capsule* 1 by ·125 in., many-seeded, dorsally compressed. *Seeds* ovoid, flattened, densely hairy. Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 325. *Cystacanthus* sp., Benth. in Benth. & Hook. f. Gen. Pl. II. 1098. *Meninia turgida*, Hook. Bot. Mag. t. 6043.

PENANG: Deschamps.—DISTRIB. Burma, Cochin-China.

19. ASYSTASIA, Blume.

Herbs or undershrubs. *Leaves* opposite, equal or nearly so. *Racemes* subterminal, unilateral, lax at base, sometimes compound; pedicels short (0 to .2 in. long), alternate or opposite, in bud and flower suberect; bract and 2 prophylla at base of the pedicel small bristles (hardly .125 in. long). *Calyx* .2 to .25 in. long, divided very nearly to the base into 5 linear or narrow-oblong segments. *Corolla* short or long; tube inflated upwards or linear; lobes 5, imbricated in the bud. *Stamens* 4, didynamous, all perfect; filaments united in pairs at the base, glabrous or slightly hairy near the base; anther-cells 2, oblong, parallel, at equal height, at base muticous or minutely auricled; pollen ellipsoid, longitudinally ribbed in the type species. *Ovary* hairy; style long, glabrous except near the base; stigmatic lobes 2 equal, hemiglobose; ovules in each cell 2. *Capsule* oblong, 4-seeded in the upper part; base contracted, sterile. *Seeds* compressed, round, often tubercled or rough, without hairs. Species 30, in South-east Asia, and in Tropical and South Africa.

Flowers alternate; inflated part of corolla-tube longer than the base 1. *A. coromandeliana*.

Flowers mostly opposite; corolla-tube linear, widened near the top 2. *A. intrusa*.

1. ASYSTASIA COROMANDELIANA, Nees in Wall. Pl. As. Rar. III. 89 (1832). A more or less dull-pubescent herb, 1 to 4 ft. high. *Leaves* from 1 to 3.5 in. long, ovate, triangular-acute at tip, entire, the margin undulate or sometimes obscurely toothed; petiole .25 to 1.75 in. long. *Racemes* 1 to 4 in. long, rarely divided (paniculate), on a peduncle 1 to 4 in. long. *Sepals* .2 in. long, linear, pubescent. *Corolla* varying from lurid pale-purple to nearly white, 1 to 1.25 in. long (see however, remark on form β below); the contracted cylindric base of the tube much shorter than its inflated upper half. *Pollen* 75 by 45 μ , with 2 stopples, and longitudinal ribs beside each stopple. *Capsule* 1 in. long; solid cylindric base .35 in.; seeds .2 in. in diam., compressed, ovoid, wrinkled or subtubercular. Nees in DC. Prodr. XI. 165 (*with syn. and var.*); Miq. Fl. Ind. Bat. II. 792; Hook. f. Fl. Br. Ind. IV. 493 (*with syn.*); Dyer Fl. Trop. Afr. V. 131, Fl. Cap. V. 42. *A. gangetica*, Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 326, fig. 131; Prain Beng. Plants 813.

PENANG: Deschamps; Waterfall, King; John Scott. SINGAPORE: Deschamps; T. Anderson; Hullett 67.—DISTRIB. Indian Peninsula; Tropical and South Africa; elsewhere perhaps only a weed of cultivation.

There is no definite line between the examples of this species with small corolla (as John Scott's Penang example, with corolla only .75 in. long and small leaves) and the *A. chelonoides*, Nees. T. Anderson called our present plant *A. gangetica*; while he has twice marked the Java *A. chelonoides* (with subcompound inflorescence) as *A. coromandeliana*.

2. *ASYSTASIA INTRUSA*, Blume Bijdr. 796 (1825) (*excl. syn.*). A slender undershrub, 2 to 5 ft. high, sparingly pubescent. *Leaves* 2 to 3 in. long, elliptic-lanceolate; base obtriangular. *Racemes* 1 to 2 in. long; flowers often opposite. *Corolla* .7 to .75 in. long, dull pink; tube linear, widened only near the top. *Capsule* .75 in. long; seeds 4, tubercular. *Stamens, pollen, pistil*, nearly as of *A. coromandeliana*. Moritsi Verz. Zoll. Pfl. 47; Hassk. Cat. Hort. Bogor. p. 149 (*excl. syn.*); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 493; Ridley in Journ. As. Soc. Straits 121 (Singapore 1900). *A. Blumei*, Nees in DC. Prodr. XI. 167; Miq. Fl. Ind. Bat. II. 793; Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 326. *Isochoriste javanica*, Miq. Fl. Ind. Bat. II. 822; Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 326.

PENANG: J. Scott; Deschamps; Curtis 2741; Waterfall, Curtis 1853, 3732. SINGAPORE: Schomburgk 72; Hullett; Ridley 3862.—
DISTRIB. Frequent throughout the Malay Archipelago.

Nees altered the name of this plant, because he says that there existed an earlier *Asystasia intrusa* of Forskahl; Forskahl's name, however, was *Ruellia intrusa*.

20. PHIALACANTHUS, Benth.

Calyx-segments united into a tube at the base (very shortly so in *P. minor*). *Inflorescence* glabrous or very nearly so; pedicels spreading, with nodding flowers. *Capsule*, where known (*i.e.* in *P. Wrayi*), supported by the hardened elongate calyx-tube; otherwise as *Filetia*.—
DISTRIB. Species 4, *viz.* the 3 below, and *P. Griffithii*, Benth., from East Assam.

Calyx-tube about as long as the teeth. Pollen with 12 raised strong longitudinal ribs 1. *P. Wrayi*.
Calyx-tube shorter than the teeth. Pollen with very obscure longitudinal ribs:—

Corolla 1.25 in. long 2. *P. major*.
Corolla .6 in. long 3. *P. minor*.

1. *PHIALACANTHUS WRAYI*, C. B. Clarke, n. sp. A branched nearly glabrous shrub, 2 to 3 ft. high. *Leaves* opposite, equal; lamina 5 by 2 in., narrowed at either end, subentire; tip acuminate; raphides obscure; petiole .75 to 1 in. long. *Panicles* 2 to 4 in. long, terminal,

sometimes reduced to a simple raceme; bracts scarcely .1 in. long; pedicels 0 to .2 in. long, in opposite pairs. *Calyx* in flower .25 to .35 in. long; teeth triangular-lanceolate, acute; calyx in fruit hardening, lengthening (up to .5 in. and upwards). *Corolla* 1 in. long and upwards, pale primrose (Wray). *Stamens* 4; filaments glabrous, united in pairs; anthers sub-equal, the two cells ellipsoid-oblong, at equal height, hardly auricled at the base; pollen 80 by 15 μ , with 2 stopples, and 12 strong raised ribs. *Capsule* more than 1 in. long, oblong-ellipsoid, smooth, 4-seeded in the upper half; retinacula large.

PERAK: Gunong Summit, alt. 6700 ft., Wray 378.

P. Griffithii, Benth., has pollen exactly as of *P. Wrayi*, and is closely allied to it, but has a much more open and compound inflorescence.

2. *PHIALACANTHUS MAJOR*, C. B. Clarke, n. sp. A nearly glabrous shrub, 6 to 8 ft. high. *Leaves* opposite, equal; the blade up to 8 by 3 in., narrowed at each end; petiole more than 1 in. long. *Panicles* 2 to 5 in. long, terminal, sometimes reduced to a simple raceme; flowers opposite; pedicels .175 in. long, spreading; buds drooping. *Calyx* nearly .35 in. long, divided more than half-way down; teeth lanceolate. *Corolla* 1.25 in. long, waxy yellowish-white. *Stamens* nearly as of *P. Wrayi*, but the pollen only obscurely ribbed longitudinally. *Pistil* as of *P. Wrayi*.

PERAK: Scortechini 249; alt. 2500 to 4000 ft., King's Collector 8146, 10929.

3. *PHIALACANTHUS MINOR*, C. B. Clarke, n. sp. Very like *P. major*, but smaller in every part. *Leaves* smaller, sometimes only 3 by .7 in. *Calyx* divided nearly to the base, .2 in. long; segments linear. *Corolla* .8 in. long.

PERAK: Scortechini.

21. FILETIA, Miq.

Herbs or small shrubs. *Leaves* opposite, subequal, petioled, entire, with few or no raphides. *Panicle* symmetrically terminal, frequently reduced nearly to a raceme or spike; pedicels largely opposite; bracts small, inconspicuous, except in *F. bracteosa*. *Calyx* .175 to .25 in. long, divided nearly to the base into 5 narrow segments. *Corolla-tube* linear or cylindric, conspicuously 2-lipped; posticous lip erect, subentire; anticous of 3 oblong lobes. *Stamens* 4, perfect, subsimilar; anthers 2-celled, the cells oblong, muticous, one placed half-way below the other, or nearly at equal height; pollen short-ellipsoid, with 2 stopples, and longitudinally striate. *Pistil* glabrous, or hairy in the lower half of the style; ovules 2 in each cell; style shortly 2-fid, or with one

branch obsolete. *Capsule* stalked, with 4 smooth, flat seeds in the clavate upper part (where known).—*DISTRIB.* Species about 10, being those here described, the type *F. costulata* from Sumatra, *F. africana*, Lindau, and several from Borneo.

We have 3 divisions of *Filetia* :—

Div. 1. EU-FILETIA.—*Corolla-tube* linear, .6 in. long; palate glabrous. Cells of the anthers quadrate, glabrous. Pollen with longitudinal lines.—*Filetia costulata*, Miq.

Div. 2. PERAKIA.—*Corolla-tube* .4 in. long, cylindric; palate (usually densely) furred. Cells of the anthers oblong or narrow-oblong, the upper one fringed with hair. Pollen with longitudinal latticed bands.—Here belong the 4 species below described, and some of Malaya.

Div. 2. AFRO-FILETIA.—*Corolla-tube* .125 to .175 of an inch long; palate glabrous. Anther-cells roundish, the lower divaricate.—Here belongs *Filetia africana*, Lindau.

Panicle spreading. Sepals small, acute, pubescent .. 1. *F. paniculata*.

Panicle reduced to a raceme or spike. Sepals glabrous, hardly

acute:—

Bracts ovate, larger than the calyx 2. *F. bracteosa*.

Bracts inconspicuous:—

Flowers subsessile. Leaves elliptic or subovate .. 3. *F. Scortechinii*.

Flowers pedicelled. Leaves oblong .. 4. *F. Ridleyi*.

1. *FILETIA PANICULATA*, C. B. Clarke, n. sp. *Branches* (seen) 8 to 12 in. long, glabrate, woody below. *Leaves*: blade 4.5 by 2 in., elliptic, narrowed at either end, nearly glabrous; nerves 8 to 10 pairs; petioles .25 to .35 in. long. *Inflorescence* of 3, nearly simple, racemes 2 to 4 in. long; floral leaves at base of inflorescence .5 in. long, linear; flowers mostly in opposite separate pairs, on pedicels .125 in. long; bract at base of pedicel linear, .125 to .175 in. long. *Sepals* .175 in. long, linear, pubescent, acute. *Corolla* .7 in. long, yellowish, densely hairy down the throat (*Scortechinii*). *Pollen* 70 by 40 μ , the longitudinal bands latticed. *Style* hairy at base; ovary nearly glabrous.

PERAK: *Scortechinii* 604.

Scortechinii marked correctly his *Filetias* as nov. genus next *Lepidagathis*.

2. *FILETIA BRACTEOSA*, C. B. Clarke, n. sp. Nearly glabrous. *Leaves*: blade up to 9 by 3 to 3.5 in., elliptic, narrowed at either end; nerves 12 pairs; petioles up to .7 in. long. *Inflorescence* a dense nearly simple spike 3 by .7 in.; flowers mostly in opposite pairs, nearly sessile; the bract ovate or nearly round, .2 in. long. *Sepals* .2 in. long, linear-ligulate, glabrous, hardly acute. *Corolla* and stamens nearly as of *F. paniculata*. *Style* hairy in the lower half. *Capsule* 1 in. long, with 4 seeds in the upper half (resembling the capsule of *Eranthemum*).

PERAK: *Scortechinii* (none of the 4 sheets numbered).

3. *FILETIA SCORTECHINII*, C. B. Clarke, n. sp. A much-branching nearly glabrous undershrub. *Leaves*: blade in the typical collections of *Scortechini* 2·5 by 1 in., elliptic, rather oblique; nerves 5 to 6 pairs; petioles 0 to ·2 in. long; in Wray 1505 the leaves are 4·5 by 1·75 in., obovate with cuneate base (see also var. β below). *Inflorescence* a simple spike 2 to 3 in. long; flowers subsessile, in opposite pairs; bract ·125 to ·175 in. long, oblong. *Sepals* ·25 in. long, linear-ligulate, glabrous, hardly acute. *Corolla* ·7 in. long, white or pale yellow, furred in the throat but much less so than in *F. paniculata*. *Stamens* and pollen as of *F. paniculata*. *Style* slightly hairy at the base.

PERAK: *Scortechini*; alt. 4500 to 4900 ft., Wray 258, 1505.

VAR. β *evolutior*. *Branches* elongate, with long internodes. *Leaves*: blade up to 5·5 by 2·25 in.; nerves 8 pairs; petiole up to ·5 in. long. *Spike* elongate, loose; the lower pairs of flowers are far apart.

PERAK: *Scortechini* 306.

This may differ specifically; the flowers are exactly as of *F. Scortechinii* type.

4. *FILETIA RIDLEYI*, C. B. Clarke, n. sp. A much-branched nearly glabrous undershrub. *Leaves* 3 by ·75 in., oblong, narrowed at each end; margins undulate; petioles ·25 to ·35 in. long. *Raceme* 2 to 3 in. long, rather loose, with opposite pairs of pedicelled flowers; pedicels ·125 to ·175 in. long; bract oblong, shorter than the calyx. *Sepals* ·2 in. long, linear-ligulate, subobtusely, glabrous. *Corolla* ·7 to ·8 in. long, white, shaped as of *F. paniculata*. *Stamens* as of *F. paniculata*; the anther-cells rather narrower. *Style* thinly clothed with long white hairs. *Capsule* 1 in. long, clavate; the 4 seeds in the broadly obovate top.

PERAK: *Ridley* 9771.

22. LEPIDAGATHIS, Willd.

Herbs or shrubs. *Leaves* entire, undulate or crenate. *Inflorescence* of spikes, or of panicles narrowed almost to spikes, many-flowered; bracts secund, usually longer than the sepals, elliptic or narrow-lanceolate, acute; prophylla smaller than the bracts. *Calyx* divided nearly to the base into narrow-lanceolate segments, whereof 2 are often larger, 2 are sometimes connate at the base. *Corolla-tube* cylindric; limb 2-lipped; the 5 segments not very unequal. *Stamens* 4, subsimilar; anther-cells 2, parallel, oblong, often minutely mucronate at the base, at equal height or one slightly below the other; pollen small, ellipsoid, with longitudinal rows of large patches. *Stigma* nearly entire. *Capsule* small, 2- or 4-seeded, conic, hairy at top. *Seeds* flattened, orbicular, hygroscopically hairy on the margin or nearly glabrate.—Species 60, in the hotter regions of the Old World; 2 in America.

Lindau, in order to get *Lepidagathis* into a Tribe characterized by honeycombed pollen, advances the explanation that in *Lepidagathis* honeycomb bands are indicated by rows of points. I reckon honeycomb-pollen to be globose without longitudinal bands, and I do not esteem the pollen of *Lepidagathis* as honeycomb-pollen.

Flowers .5 in. long. Spikes rarely up to 3 in. long:—

Leaves 3 to 5 in. long. Spikes .5 to 1.5 in. long	..	1. <i>L. incurva</i> .
Leaves 6 to 7 in. long. Spikes 2 to 3 in. long	..	2. <i>L. chlorostachya</i> .

Flowers 1 to 1.3 in. long. Spikes 4 to 8 in. long:—

Upper bracts elliptic-lanceolate. Corolla pink-purple, 1 in. long	..	3. <i>L. longifolia</i> .
Upper bracts linear. Corolla white, 1.3 in. long	..	4. <i>L. macrantha</i> .

1. *LEPIDAGATHIS INCURVA*, D. Don Prodr. Fl. Nepal. 119 (1825). *Stem* suberect, 1 to 2 ft. high, decumbent, rooting at base. *Leaves* 3 to 5 in. long, oblong, narrowed at each end, pubescent or nearly glabrate; margin often undulate; petiole .5 in. long. *Spikes* .5 to 1.5 in. long, oblong, axillary and terminal, erect, sessile, often clustered, ciliate, often softly hairy; bracts secund, nearly .5 in. long, lanceolate, mucronate; prophylla nearly .35 in. long, lanceolate, mucronate. *Sepals* 5, narrow-lanceolate, nearly .35 in. long, unequal. *Corolla* .25 in. long, white with brown spots on the palate. *Anther-cells* one slightly below the other, often minutely tailed. *Capsule* .2 in. long, conic, hairy at top. *Seeds* 4, flat, slightly hairy on the margin. Kurz in Flora LIII. 363 (1870). *L. hyalina*, Nees in Wall. Pl. As. Rar. III. 95 (1832), and in DC. Prodr. XI. 252; Miq. Fl. Ind. Bat. II. 815; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 521; Hemsl. in Journ. Linn. Soc. XXVI. 244 (1890); Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 313; Prain Beng. Plants 815. *L. cephalotes*, O. Kuntze Revisio I. 492. *Ruellia dependens*, Roxb. Fl. Ind. III. 49. *Hypoestes cephalotes*, Link Jahrb. III. 48.

PENANG: Curtis 2760, 3733; Ridley 2760, 7170, alt. 100 to 200 ft.; King's Collector 1292. KEDAH: Ridley 8319.—DISTRIB. Common throughout India; extending to China and Malaya.

2. *LEPIDAGATHIS CHLOROSTACHYA*, Nees in DC. Prodr. XI. 256 (1847). *Leaves* 7 by 2.25 in., elliptic-lanceolate, acuminate, attenuate at the base. *Spikes* often 2 to 3 in. long, broader than in *L. incurva*; otherwise as in *L. incurva*. T. Anders. in Journ. Linn. Soc. IX. 496 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 519.

PENANG: Pulo Poongah, Curtis 2941.—DISTRIB. Mergui, Griffith (K.D.) 6141.

This is a much larger plant than *L. incurva*; the bracts are longer and the spikes manifestly broader, but the corolla is hardly longer.

3. *LEPIDAGATHIS LONGIFOLIA*, Wight Ic. Pl. Ind. Or. t. 1564 (1850). 882

Shrubby, 3 to 6 ft. high. *Leaves* up to 9 by 2 in., lanceolate, acuminate at either end, glabrous; *petioles* .7 in. long. *Panicles* narrowed nearly to spikes, 6 to 8 in. long, pubescent; *bracts* lax, .75 by .35 in., elliptic, apiculate. *Sepals* nearly .5 in. long, lanceolate, unequal. *Corolla* "pink-purple" or "dull crimson," 1 in. long; tube at top subcampanulate. *Anther-cells* at equal height, minutely mucronate at the base; pollen of the genus. *Capsule* seen only young, promises to be conic, small. T. Anders. in Journ. Linn. Soc. IX. 499 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 523; Ridley in Trans. Linn. Soc. ser. 2, III. 332 (1893).

MALACCA: *Griffith* (K.D.) 6138; *Maingay* (K.D.) 1751; *Goodenough* 1690. NEGRI SEMBILAN: *Muar*, *Fox* 11283. PAHANG: *Ridley* 2174. JOHORE: *Ridley* 11127; *Curtis*. PERAK: *Scortechini* 2038; *Wray* 1297; *Goenong Panli*, *King's Collector* 229; alt. 300 to 500 ft., *King's Collector* 3025, 10040. KOTA GLANGGI and PULAU TAWAR: fide *Ridley*. SELANGOR: *Curtis* 2362. SINGGA: *Hullett* 5718.

4. LEPIDAGATHIS MACRANTHA, C. B. Clarke, n. sp. *Bracts* lanceolate at top, the upper nearly linear, .75 by .125 in. *Corolla* white, very pubescent without, 1.3 in. long; otherwise as *L. longifolia*.

PERAK: alt. 300 ft., *Wray* 3385.

This may prove a variety only of *L. longifolia*, Wight; among the abundant collections of *L. longifolia* there is no specimen that matches *L. macrantha*.

23. BARLERIA, Linn.

Herbs or undershrubs, sometimes prickly. *Leaves* opposite or whorled, two of a whorl often reduced to spines. *Inflorescence* a terminal spike (in the Malay Peninsula plants); *bract* large; *prophylla* 2 or 0. *Calyx* large, of 4 distinct segments, 2 inner segments much the smaller. *Corolla* with a cylindric tube an inch or more long. *Stamens* 2, perfect; *anther-cells* 2, at equal height, mucous; pollen globose, honeycombed. *Ovary* with 2 to 1 ovules in each cell; *stigmas* 2, short. *Capsule* ovoid; seeds 2 to 4, large, shaggy with hygroscopic hairs or nearly glabrate.—Species 120, mostly in Africa and Tropical Asia, a few in America.

Leaves with interpetiolar spines.	Corolla yellow	..	..	1. <i>B. Prionitis</i> .
Spineless.	Corolla blue	..	..	2. <i>B. conspicua</i> .

1. BARLERIA PRIONITIS, Linn. Sp. Pl. 636 (1753). Glabrous or nearly so. *Stems* 1 to 3 ft. high. *Leaves* 2 to 5 by .3 to 1 in., elliptic, narrowed at both ends, mucronate; interpetiolar spines .25 to .75 in. long. *Inflorescence* terminal; lower flowers of the spike often a little distant; flower-bract lanceolate, widened at the base;

posticous sepal nearly .5 in. long, elliptic mucronate; anticus calyx-segment similar to the posticous sepal. *Corolla* yellow; tube hardly .5 in. long; posticous lip of 4 connate segments .7 in. long; anticus lip clawed, shorter. *Capsule* .5 to .7 in. long, 2-seeded. C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 482 (*with syn.*); Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 314, tt. 105c, 106b, 125e; Dyer Fl. Cap. V. 46 (*with syn.*); Prain Beng. Plants 811, 812.

MALACCA: Griffith; Ridley 2696; Harvey; Derry 271.—DISTRIB. Africa, India.

This plant (with closely allied species) is abundant in Africa, and probably wild in Western India. In Eastern India it is cultivated, and found near villages. It may not be wild at Malacca.

2. *BARLERIA CONSPICUA*, Nees in Wall. Pl. As. Rar. III. 92 (1832). Large, sparingly pubescent, without spines. *Leaves* 8 by 2 in., oblong, acuminate at either end; petioles .5 in. *Spikes* 5 by nearly 1 in., loose, nearly continuous; bracteoles present, .7 in. long, linear-oblong, minutely strigose; outer sepals .7 in. long, lanceolate, one bifid at the top, with some yellow hairs. *Corolla* 1 in. long, blue. *Capsule* .75 in. long, narrowly oblong, glabrate, 4-seeded. *Seeds* ultimately nearly glabrate. Nees in DC. Prodr. XI. 226; T. Anders. in Journ. Linn. Soc. IX. 493 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 489. *Justicia conspicua*, Wall. Cat. 2460.

PENANG: Wallich.

24. *ERANTHEMUM*, R. BROWN [Linn. *partim*].

Undershrubs, some very small. *Leaves* opposite, equal or nearly so, petioled, entire, often undulate or obscurely crenulate, nearly glabrous, usually pubescent at least on the midrib beneath. *Panicles* narrow, or reduced to apparent spikes, terminal in the species of the Malay Peninsula; bracts linear, inconspicuous, only in *E. caudifolium* so much as .25 in. long. *Calyx* .125 to .2 in. long (.25 in. long or more in *E. caudifolium*), divided to the base into linear segments, pubescent, ultimately often glabrate. *Corolla* showy, white or colorate; tube linear (except in *E. breviflos*); segments 5, quadrate-elliptic, subequal, spreading, more or less one-sided. *Stamens* 2; filaments very short; anthers in the mouth of the tube or just exsert, of 2 parallel oblong mucous cells placed at equal height; pollen shortly ellipsoid or subglobose, with 2 stopples and 6 to 10 longitudinal bands, often obscure. *Ovary* with 2 ovules in each cell; style with 2 subequal minute lobes. *Capsule* with a linear-cylindric base, and 2 to 4 seeds in the much-widened upper half. *Seeds* ovoid, flattened, glabrate, corrugate. — DISTRIB.

Species 90 (after Mackaya has been taken out), mainly in South-east Asia and Oceania; a dozen species in Tropical Africa with Madagascar, and a few in Tropical America.

- Pistil clothed with brown hairs. Flowers .75 in. long .. 1. *E. hirtipistillum*.
 Pistil with a few patent thin hairs or glabrate:—
 Corolla-tube .5 to .6 in. long:—
 Spikes 3 to 6 in. long; lower flowers solitary, distant .. 2. *E. porphyranthos*.
 Panicles 1.5 in. long, of 6 to 12 small flowers .. 3. *E. breviflos*.
 Panicles long, dense; flowers clustered or cymulose:—
 Sepals .125 to .25 in. long; leaf-base attenuate .. 4. *E. cardifolium*.
 Sepals scarcely .125 in. long; leaf-base obtuse .. 5. *E. selangorensis*.
 Corolla-tube 1 to 1.8 in. long:—
 Panicle often reduced to an apparent spike:—
 Flowers white:—
 Panicle of elongate, interrupted spikes .. 6. *E. album*.
 Spikes dense. Flowers clustered .. 8. *E. Kingii*.
 Flowers coloured:—
 Flowers solitary, all close in a continuous spike .. 7. *E. malaccense*.
 Flowers in whorls, the lower standing apart .. 9. *E. acuminatissimum*.
 Panicle with lower branches .175 in. long, carrying
 small cymes 10. *E. Tetjmanni*.

1. *ERANTHEMUM HIRTIPISTILLUM*, C. B. Clarke, n. sp. Erect, 2 ft. high, pubescent. *Leaves* up to 8 by 3 in., elliptic-acuminate, base sub-obtuse, fuscous beneath, pubescent on both surfaces; primary nerves 10 pairs; petiole 1.5 in. *Inflorescence* of 3 to 1 panicles reduced to spikes, 4 to 9 in. long; flowers in clusters of 1 to 5, opposite, mostly .25 to 1 in. apart; bracts linear, .175 in. long. *Sepals* .2 in., linear, very pubescent. *Corolla* pale pink; tube .5 in. long; lobes hardly .3 in. long. *Stamens* and pollen of the genus; the filaments and anthers slightly hairy. *Ovary* and style-base clothed with erect brown hairs. *Capsule* nearly 1 in. long, with 4 seeds in the hairy top, constricted between the pairs of seeds. *Seeds* of the genus.

PERAK: Wray 1399.

2. *ERANTHEMUM PORPHYRANTHOS*, C. B. Clarke, n. sp. A sparingly hairy, suberect, simple-stemmed undershrub, 1 to 2 ft. high. *Leaves* very variable in size; blade sometimes 7 by 2.5 in., sometimes 2 by .7 in., elliptic-lanceolate-acute; base cuneate; margin often undulate, sub-crenulate; lower surface nearly glabrous or pubescent on the midrib, often when dry whitened; primary nerves 6 pairs; petioles .25 to .3 in. long. *Inflorescence* a linear spike, 3 to 6 in. long (but see var. β); flowers sessile, in opposite pairs, the lower pairs .25 to .35 in. (and upwards), distant; bracts linear, hardly .175 in. long. *Sepals* .15 in. long, linear, minutely pubescent. *Corolla* purple, or light purple, or "white

tinged carnation" (Scortechini); tube .5 in. long, linear, very slender, the upper .175 in. widened, oblong; lobes elliptic, .35 in. long. *Stamens* of the genus. *Style* slightly hairy near the base. *Capsule* .7 in. long, with 4 seeds in the top, minutely pubescent, constricted between the pairs of seeds; seeds corrugated, subscabrous. *E. crenulatum*, Nees in DC. Prodr. XI. 453 (a partly). *E. malaccense*, C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 498 (partly).

PENANG: *Ridley*; *Deschamps*; *Curtis* 499. MALACCA: *Cuming* 2357. PERAK: *Scortechini* 114, 543, 564; Larut Perak, alt. 1000 to 1500 ft., *King's Collector* 3907.

The very slender short tube of the corolla, having an oblong dilatation in the upper third of it, marks this species off from most *Eranthemums*.

VAR. *β evolutior*, C. B. Clarke. *Panicle* of numerous elongate spikes, with additional spikes from the leaf-axils; *corolla-tube* up to .7 in. long.

PENANG: Waterfall, *Curtis* 348.

3. *ERANTHEMUM BREVIFLOS*, C. B. Clarke, n. sp. A small, woody, crooked-stemmed, branched, nearly glabrous undershrub, 4 to 8 in. high. *Leaves* 4 by 1.75 in., elliptic, shortly narrowed at each end; nerves 6 pairs; midrib beneath glabrate in the mature leaf; petioles .25 to .75 in. long. *Inflorescence* a panicle 1.5 in. long, of 6 to 12 flowers, nearly glabrate, on a peduncle .5 in. long; pedicels 0 to .175 in. long; bracts minute, setaceous. *Sepals* .125 in. long, linear, when young minutely pubescent. *Corolla* "grey"; tube .25 in. long, cylindric. *Stamens* and pollen of *Eranthemum*, glabrous. *Capsule* .8 to .9 in. long, linear-oblong; seeds 4, in the upper part, nearly smooth.

PERAK: Goping, *King's Collector* 518.

This plant appears closely allied in habit to *E. album*; the short cylindric corolla-tube and linear-conic capsule (not suddenly narrowed into a cylindric stalk) with smooth seeds, suggest that it may belong to a different genus.

4. *ERANTHEMUM CAUDIFOLIUM*, C. B. Clarke, n. sp. A shrub, 4 to 5 ft. high, branched upwards, sparingly pubescent. *Leaves*: blade 7.5 by 2.5 in., elliptic, acuminate at either end, with a linear caudate tip (in *Scortechini* n. 447), but in other examples leaves are seen narrower with a shorter tip; nerves 7 to 8 pairs; petioles of the lower leaves often 2 to 2.5 in. long, of the upper only .25 in. *Inflorescence* a narrow dense panicle 6 by 2 in., with brown pubescence; lateral branches hardly .2 in. long, carrying small dense cymes; bracts .35 in. long, linear, setaceous. *Sepals* .175 to .25 in. long, linear, caudate. *Corolla* white (*Curtis*); tube .5 to .6 in. long, often curved towards the top; segments .2 in. long. *Stamens* of the genus. *Pistil* and style

very thinly hairy. Capsule 1 in. long, with 4 seeds in the upper part.

PERAK: *Scortechini* 447, 1531; *Curtis* 3150, 3341. DINDINGS: *Ridley* 3066 *bis*.

There are abundant collections and a detailed MS. description of this plant by *Scortechini*. It is easily recognized by the small flowers with a large capsule, sometimes more than an inch long.

5. *ERANTHEMUM SELANGORENSE*, C. B. Clarke, n. sp. A branched shrub, minutely pubescent. *Leaves*: blade 5 to 6 by 2·5 in., elliptic-acuminate; base obtuse or rounded. *Panicle* 3 by 1 to 2 in.; lower branches sometimes much developed, 1 in. long, carrying 3 to 6 flowers. *Sepals* scarcely ·175 in. long. *Corolla-tube* ·6 in. long. Otherwise as *E. caudifolium*.

SELANGOR: *Sungu Bulu*, *Goodenough* 10547; *Kwala Lumpor*, *Curtis* 2367.

6. *ERANTHEMUM ALBUM*, Nees in DC. Prodr. XI. 455 (1847). A nearly glabrate undershrub, 1 to 3 ft. high. *Stem* usually lignescent, with white bark, to the very base of the inflorescence. *Leaves* opposite, subequal; blade 5·5 by 2·5 in., shortly acuminate at either end, often whitened underneath; margins often obscurely undulate, crenulate; nerves 7 pairs; petioles ·5 to 1 in. long. *Inflorescence* a panicle of many thin spikes, 4 to 8 in. long (poor examples with one spike occur); flowers mostly solitary, in distant pairs, the lower ·25 in. apart or more; bracts linear, ·175 in.; pedicels 0 to ·175 in. (*i.e.*, the spike is itself a contracted panicle). *Sepals* ·175 in. long, linear, minutely pubescent. *Corolla* white; tube 1 to 1·3 in. long, linear, exactly the same width to the top. *Stamens* and pistil glabrous; pollen subglobose, 30 μ in diam., lightly banded longitudinally. *Capsule* 1 in. long, glabrous or scarcely microscopically puberulous, 4-seeded near the top, slightly contracted between the pairs of seeds. *Seeds* corrugated. C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 498; *Ridley* in Journ. As. Soc. Straits 121 (Singapore 1900); *Prain* Beng. Plants 814. *E. diversifolium*, Miq. Fl. Ind. Bat. II. 837. *E. crenulatum*, Nees in DC. Prodr. XI. 453. Var. *a* (*partim*), 454; Var. γ *angustifolia* (*partim*). *Justicia alba*, Roxb. Fl. Ind. ed. Carey & Wall. I. 117 (1820); Ic. Ined. 1105 in hb. Kew. *J. orbiculata*, Wall. Cat. 2489 B.

MALACCA: *Griffith*. MALAY PENINSULA: *Griffith* (K.D.) 6175 (*partly*).—DISTRIB. Chittagong; Pegu; abundant in the Andamans and Nicobars; Malaya.

Nees' type example of his *E. Zollingerianum*, viz. Zollinger 162 in Java lectus, is in Kew, but is not this. In the large examples the panicle has many long curved spikes,

the second flowers all turned to the convex side of the spike. The smaller forms (?), i.e. *J. orbiculata*, Wall., have a single straight spike.

7. *ERANTHEMUM MALACCENSE*, C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 498 (1884) (*tab. et syn. excl.*). *Innovations* pubescent. *Stem* up to 4 to 5 ft. high, often branching. *Leaves*: blade 5·5 by 1·25 in., lanceolate or narrow, elliptic-lanceolate, acute at either end; nerves 7 pairs, oblique; petioles ·175 to ·35 in. long. *Flowers* subsessile, numerous, close together in a spike nearly continuous to its base, mostly solitary, opposite; spikes 2 to 3 in. long, one or several at the end of each branch; pedicels rarely up to ·075 in. long; bracts hardly longer than the pedicels. *Sepals* about ·075 in. long, narrow, pubescent. *Corolla* of one colour, variously noted as violet, purple, pink, pink-yellow, yellow-green; tube 1·125 in. long, linear to the top. *Stamens* of the genus. *Pistil* with few patent thin hairs or subglabrate. *Capsule* (in a Yunnan plant referred here) ·7 in. long, clavate, 4-seeded, very nearly glabrous. Ridley in Trans. Linn. Soc., ser. 2, III. 333 (1893). *E. erectum*, T. Anders. in Journ. Agri.-Hort. Soc. Ind. new ser. I. 286 (1868). *E. crenulatum* var. *grandiflora*, T. Anders. l.c. *E. Blumei*, T. Anders. l.c. (*non* Nees). *E. crenulatum*, Nees in Wall. Pl. As. Rar. III. 107 (*in large part*), and in DC. Prodr. XI. 523 (*in part, not of Lindley*). *Pseuderanthemum malaccense*, Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 330.

PROVINCE WELLESLEY: *Curtis* 203; *Ridley* 2231. KEDAH: Langkawi Island, *Curtis*; *Ridley* 8335. MALACCA: common, fide *Ridley*; *Griffith* (K.D.) 6175; *Cuming* 2389; *Harvey*; *Goodenough* 1713; *Holmbury* 732; Mt. Ophir, *Lobb*. PERAK: alt. 500 ft., *King's Collector* 8567, 8626, 8665; *Curtis* 3327. PEKAN: fide *Ridley*. JOHORE: *Curtis*.—DISTRIB. Siam.

This species, abundant in its area, is characterized by the uniform inflorescence, and is always collected in flower. *E. palatiferum*, Bot. Mag. t. 5957, of which (in Fl. Br. Ind. IV. 498) I referred one piece to *E. malaccense*, is undoubtedly all true *E. palatiferum*, of which it has the characteristic inflorescence; the colour of the flowers varies from pale pink to bluish purple in both species. The name *E. erectum*, T. Anders., is older than *E. malaccense*, but was published without one word of description.

8. *ERANTHEMUM KINGII*, C. B. Clarke, n. sp. *Branches* elongate, with long internodes. *Leaves* elliptic, shortly acuminate at the tip, hardly acuminate at the base, paler beneath when dry. *Spikes* solitary, 2 to 4 in. long, dense; the lower axils with 1 to 3 flowers in each axil. *Corolla* white; tube 1·125 in. long. Otherwise as *E. malaccense*, C. B. Clarke.

JOHORE: Jaffaria, *King*. SINGAPORE: *Hullett* 810.

The leaves of this species resemble those of *E. album*, Nees, while the spikes resemble those of *E. malaccense*, but are slightly more pubescent, and the corolla is white.

9. *ERANTHEMUM ACUMINATISSIMUM*, Miq. Fl. Ind. Bat. II. 835 (1856). Erect, nearly glabrous. *Leaves*: blade 8.5 by 2 in., acuminate-attenuate at either end; nerves 8 pair, oblique; raphides on the upper surface numerous, very short; petioles 1 in. *Spikes* 1 to 3, 7 to 10 in. long, many-flowered, the lower clusters half-whorled, .5 to 1 in. apart, with 5 to 10 flowers to the whorl; the upper whorls fewer-flowered, coalescent; bracts .2 in. long, lanceolate-linear. *Sepals* .2 in. long, nearly linear, ultimately nearly glabrous. *Corolla* white, with one segment purple-spotted; tube 1.25 in. long. *Stamens* of the genus. *Capsule* 1.125 in. long, with 4 seeds in the upper part, slightly constricted between the seeds. *E. Andersoni*, Masters in Gard. Chron. 134, 136 (1869); Bot. Mag. t. 5771; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 499; Ridley in Trans. Linn. Soc., ser. 2, III. 333 (1893), and in Journ. As. Soc. Straits 121 (Singapore 1900). *E. elegans*, Masters in Gard. Chron. 1234 (1868) (not of R. Brown). *E. Blumei*, Hassk. Cat. Hort. Bogor. 151; T. Anders. in Journ. Agri.-Hort. Soc. Ind. new ser. I. 285 (1868), and in Journ. Linn. Soc. IX. 523 (1867); Kurz in Flora LIII. 363 (1870) (not of Miquel). *E. diantherum*, Blume Bijdr. 793 (not of Roxb.). *E. aspersum*, Hook. Bot. Mag. 5711. *Pseuderanthemum Andersoni*, Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 330.

SINGAPORE: *T. Anderson* 112. JAVA: cult. in Hort. Bogor. (*Kurz* 379). *Ridley*, l. c., thinks the Singapore collection was probably a garden escape.

The "type" of *E. acuminatissimum*, Miquel, from Utrecht, proves identical with the *E. Andersoni*, Masters. It was, perhaps, *E. viscidum* β *acuminatissimum*, Hassk. Hort. Bogor. p. 151, but not *E. viscidum* β Blume. The *E. Blumei*, Miq. (Fl. Ind. Bat. II. 836) is before me, and very closely allied to *E. acuminatissimum*, but has (as Miquel says) smaller leaves, smaller bracts, and smaller calyx.

10. *ERANTHEMUM TELJSMANNI*, T. Anders. in Journ. Agri.-Hort. Soc. Ind. new ser. I. 285 (1868). "A shrubby creeper, 8 to 12 ft. long" (King's Collector). *Branches* .25 in. in diam., with numerous secondary branches springing at a right angle. *Leaves*: blade 6 by 2 in., broad-oblong, acuminate; nerves 6 pair; base often rounded or truncate, but on the same branch sometimes cuneate-oblique; petioles .25 to 1.25 in. long. *Inflorescence* a narrow, many-flowered panicle rarely so much as 6 in. long; the lower branches hardly .175 in. long, carrying small cymes (almost clusters) of flowers. *Calyx* and *corolla* (white tinged blue) as of *E. acuminatissimum*, Miq. *E. Blumei*, Hort. Buitenzorg viz Miquel. *E. crenulatum* ? var., T. Anders. MS.

PERAK: *Scortechini* 1356; Tapa, alt. 2000 to 3000 ft., *Wray* 837; *King's Collector* 2176; Larut, alt. 5000 to 800 ft., *King's Collector* 5489. MALACCA: H.D. 364.

T. Anderson's whole diagnosis of his *E. Teijsmanni* is "a fine species with a straggling habit"; and I have no authentic specimen; the name is disposable. Whether this was the imperfectly known *E. graciliflorum*, Nees (Wall. Pl. As. Bar. V. 3, 107), from Penang I cannot say; it is not the *E. graciliflorum* of Madura (Java) distributed from the Buitenzorg Garden. This species resembles much *E. hirtipistillum* (collected at the same locality), but the corolla-tube is here 1·3 to 1·5 in. long.

25. CLINACANTHUS, Nees.

A rambling shrub. *Flowers* conspicuous, in small drooping cymes at the ends of the branches; bracts and prophylla small, linear. *Sepals* 5, equal, linear. *Corolla-tube* narrow, funnel-shaped; limb 2-lipped. *Stamens* 2; anthers of 1 cell, oblong, muticous; pollen ellipsoid, with 2 longitudinal bands. *Style* very shortly 2-fid. *Capsule* stalked, 4-seeded. Only 1 species.

1. CLINACANTHUS BURMANNI, Nees in DC. Prodr. X. 511 (1847). *Stems* round. *Leaves* glabrate; blade 3 by ·5 to ·8 in., elliptic-lanceolate or lanceolate, entire or crenate; base obtuse or attenuate; petiole ·25 in. long. *Cymes* pubescent, 5- to many-flowered; bracts ·125 in. long. *Sepals* ·25 in. long, minutely hairy. *Corolla* orange-red or dull scarlet, 1·25 in. long, lobed one-third to half-way down. *Stamens* glabrous, no rudiments. *Style* glabrous. Miq. Fl. Ind. Bat. II. 854; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 524; Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 340; Hemsl. in Journ. Linn. Soc. XXVI. 244 (1890). *C. nutans*, Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 340. *Justicia nutans*, Burm. Fl. Ind. 10, t. 5, fig. 1. *J. fulgida*, Blume Bijdr. 784. *Beleropone ? fulgida*, Hassk. Cat. Hort. Bogor. 151.

MALACCA: *Maingay* 1977 (K.D. 1180); Songkah, *Curtis* 2904.—
DISTRIB. Siam, Borneo, Hainan.

26. JUSTICIA, Linn.

Herbs or shrubs. *Leaves* opposite, subequal or sometimes pseud-alternate, entire or undulate. *Inflorescence* various in the different sections, from strobilate spikes to panicles with the flowers all pedicelled; bracts and prophylla small, linear, sometimes lanceolate, or in the strobilate spikes round, large, imbricate (these large round bracts in many cases cover more than one flower, and are then floral leaves). *Calyx* small, deeply 5-fid (4-fid in Sect. ROSTELLARIA). *Corolla-tube*

shorter (or scarcely longer) than the 2-lipped limb; segments imbricated (not twisted) in the bud. *Stamens* 2; anther-cells 2, one below the other, tailed; pollen ellipsoid, small, longitudinally ribbed beside the stopples. *Ovary* 4-celled; style shortly bifid. *Capsule* regularly dehiscent; 4-seeded (the placentæ not springing elastically from the base of the capsule), stalked with the seeds in the top, or seed-bearing nearly from the base. *Seeds* ovoid, flattened, verrucose, subtubercular, glabrous (except in Sect. RHAPHIDOSPORA).—DISTRIB. Species 150, widely spread throughout the hot regions of the world.

This genus is only artificially separated from several others (as from *Leda Adhatoda*, *Ptyssiglottis*) by the white tail to the lower anther-cell. If this character be not regarded as of generic importance, the number of species may be 300, as in the arrangement by Lindau in Engl. & Prantl Pflanzenfam.

Sect. 1. BRACTEATÆ. Bracts (floral leaves) round, large, strobilate at least in the young spikes :—

Flowers mostly solitary under each bract (floral leaf) :—

Corolla glabrous without, except a few hairs at the tip .. 1. *J. ptychostoma*.

Corolla hairy without :—

Nerves of the leaves 6 to 7 pairs :—

Leaves mostly cuneate at the base .. 2. *J. pubiflora*.

Leaves rounded at the base .. 4. *J. Scortechinii*.

Nerves of the leaves 10 to 11 pairs .. 3. *J. patulinervis*.

Flowers 2 to 3 or more clustered under each bract :—

Bracts .5 in. long, including the petiole .. 5. *J. subcymosa*.

Bracts .6 in. long, subsessile .. 6. *J. selangorensis*.

Sect. 2. CALOPHANOIDES. Flowers axillary, cymose, solitary or clustered; without a terminal cyme or panicle. Corolla small :—

Leaves opposite, subequal :—

Leaves elliptic .. 7. *J. quadrifaria*.

Leaves linear-oblong .. 8. *J. Neesiana*.

Leaves apparently alternate, i.e. one of each pair 0 or minute, deciduous :—

Leaves on the nerves beneath and stem nearly glabrous :—

Herb, with long internodes .. 9. *J. henicophylla*.

Much-branched shrub .. 10. *J. subalternans*.

Leaves on the nerves beneath and stem hairy .. 11. *J. alternifolia*.

Leaves one of each pair reduced to a persistent ear .. 12. *J. otophora*.

Sect. 3. GENDARUSSA. Spikes terminal, and terminal on short axillary branches; bracts mostly narrow, the lowest rarely imbricate :—

Leaves narrow-oblong or lanceolate :—

Spikes dense; flowers clustered .. 13. *J. Gendarussa*.

Spikes lax; flowers mostly solitary .. 14. *J. Maingayi*.

Leaves elliptic, large (5 to 8 in. long) :—

Peduncles short :—

Spikes linear, interrupted .. 15. *J. vasculosa*.

- Spikes dense 16. *J. uber*.
 Peduncles long; carrying panicles of linear spikes .. 17. *J. sumatrana*.
 Sect. 4. ROSTELLULARIA. Spikes cylindric; bracts narrow, about as
 long as the calyx. *Calyx* of 4 linear segments, the 5th suppressed:—
 Corolla .25 to .35 in. long 18. *J. procumbens*.

Justiciaria conspicua, Dayd.-Jack. Ind. Kew., is a bare name, founded on Wall. Cat. n. 2475. The "type" of this came from Penang; but Wallich sorted with it, doubtfully, one plant from hb. Wight, another from Silhet. I have not found n. 2475.

1. *JUSTICIA PTYCHOSTOMA*, Nees in Wall. Pl. As. Rar. III. 108 (1832). A herb, very sparingly pubescent. *Stem* 1 to 4 ft. high, branching; internodes 3 to 6 in. long. *Leaves* 6.5 by 2.25 in., elliptic-lanceolate, acuminate at tip, cuneate at base (but see the Varieties below), often undulate or obscurely crenate on the margin, with very small raphides on both surfaces; primary nerves 7 to 9 pairs, oblique; petioles .5 to 1.5 in. long; opposite pairs of leaves equal or rarely somewhat unequal. *Peduncles* terminal, penultimate, or axillary, 1 to 2 in. long, frequently 2 from one axil; spike 1 in. long, or lengthening to 1 to 4 in. long; bracts round, ovate, green, .3 to .35 in. long, shortly stalked, very caducous, nearly glabrous, but often with white bristles on the margin; with 1 (rarely 1 to 2) flower under each bract. *Calyx* .125 in. long, nearly glabrous; segments linear. *Corolla* lurid white-yellow marked with purple grey lines; corolla before expansion nearly .5 in. long, glabrous without, or with a few hairs at the very tip. *Filaments* glabrous; anther-cells round, one lower than the other with a short conic white tail; pollen small, ellipsoid, 30 μ long, with two stopples and two rows of tubercles (or round patches) on each side of the stopple. *Pistil* glabrous; style very shortly 2-fid. *Capsule* .5 in. long, glabrate, 4-seeded. *Seeds* flattened, verrucose, subtubercled. T. Anders. in Journ. Linn. Soc. IX. 517 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. 4 534 (emend.). *Rhytiglossa ptychostoma*, Nees in DC. Prodr. II. 337. *R. ptychosperma*, Miq. Fl. Ind. Bat. II. 825.

PERAK: *Scortechini* 689; *Wray* 2046; alt. 100 ft., *King's Collector* 2077. PENANG: *Porter* (Wall. Cat. 2478). KEDAH: *Curtis* 2117.

VAR. β *angustifolia*, C. B. Clarke. *Leaves* lanceolate or linear-lanceolate.

PERAK: alt. 5000 ft., Gunong Inas, *Wray* 4130.

VAR. γ *rotundifolia*, C. B. Clarke. *Leaves* 6 by 3.5 in., rounded at the base.

PERAK: *Ridley* 7163.

VAR. δ *auriculata*, C. B. Clarke. *Leaves* narrowly, unequally cordate at base, with two ears.

PERAK: alt. 500 ft.; *King's Collector* 2062; *Scortechini*.

This is a striking var.; some of Scortechini's examples show on the same stem leaves acute at base and leaves auricled at base.

VAR. ϵ *parvibracteata*, C. B. Clarke. *Spikes* interrupted at base; bracts very small, round, long-petioled, spreading, hardly (or not) imbricated.

PERAK: Ridley 7166; Goping, King's Collector 555.

Wallich's (one) type sheet of this is very imperfect, as can be inferred from Nees' description, and my account in Hook. f. Fl. Br. Ind. is erroneous both as to the bracts and the synonymy.

2. *JUSTICIA PUBIFLORA*, C. B. Clarke, n. sp. *Leaves* 4 to 6 in. long, elliptic-lanceolate, cuneate or rounded at the base; nerves 6 pairs; raphides none (or most obscure) on either surface. *Peduncles* terminal, and a few axillary; bracts (floral leaves) round-ovate, green, .35 in. long, shortly stalked, pubescent, without white bristles on the margin. *Calyx* pubescent. *Corolla* very hairy without. *Style* at base slightly hairy. *Anther-cells* short-ellipsoid, the lower with a medium ovoid tail; pollen ellipsoid; pores 2; one longitudinal row of tubercles on either side of each pore. Otherwise resembling *J. ptychostoma*, Wall.

PERAK: alt. 4000 ft., King's Collector 3671; Scortechini.

3. *JUSTICIA PATULINERVIS*, C. B. Clarke, n. sp. Sparingly pubescent. *Leaves* 6 by 4 in., crenate, truncate at base, very shortly cuneate on the petiole; nerves 10 to 11 pairs, spreading at right angles from the midrib. *Spike* dense; bracts nearly glabrate, with some white bristles on the margin. *Corolla* hairy without. Otherwise as *J. pubiflora*.

PERAK: Scortechini.

4. *JUSTICIA SCORTECHINII*, C. B. Clarke, n. sp. *Leaves* 3 to 4 in. long, ovate or elliptic-acuminate, most of them rounded at the base, crenulate; nerves 6 to 7 pairs, without raphides. *Spikes* dense; bracts round-ovate, imbricate, somewhat pubescent, not bristle-ciliate. *Corolla* hairy without. *Capsule* hairy, nearly to the base. Otherwise as *J. pubiflora*.

PERAK: Scortechini 41, 387.

The leaves have dried a rich brown in all the nine sheets of Scortechini, so that they look very unlike the preceding three species.

5. *JUSTICIA SUBCYMOSA*, C. B. Clarke, n. sp. *Stem* 2 to 5 ft. high. *Leaves* ovate-acuminate, up to 9 by 5½ in., mostly obtuse at the base; nerves 11 pairs; petioles 1 to 2 in. long. *Inflorescence* up to 9 by 1 in.; bracts .5 in. long (petiole included), ovate, at first imbricated, in fruit often distant patent; a condensed cyme of 3 to 7 flowers under each floral leaf. *Sepals* hardly .125 in. long, pubescent. *Corolla* pale

yellow, .5 in. long, hairy without. *Capsule* nearly .7 in. long, hairy to the base. *Stamens* and pistil nearly as of *J. ptychostoma*.

PENANG: *Curtis* 1765. PERAK: *Scortechini*; alt. 500 to 1000 ft., *King's Collector* 5766, 10244. SELANGOR; *Ridley* 7593.

A larger plant than the four preceding. It has been supposed allied to *J. decussata*, Roxb., but the pseudo-spikes do not branch.

6. *JUSTICIA SELANGORENSIS*, C. B. Clarke, n. sp. *Leaves* 9 by $4\frac{1}{2}$ in., elliptic, shortly acuminate, rounded or cuneate at the base, dark purple (*Ridley*); nerves 9 to 10 pairs, oblique; petioles 2 to 4 in. long. *Peduncles* .75 in. long; spikes 4 by 1.25 in., slightly pubescent; bracts ovate or obovate, up to .6 in. long, subsessile, glabrate, imbricate, purple (*Ridley*), with 2 or 3 flowers under each. *Calyx* small, glabrate. *Corolla* white (*Ridley*). *Capsule* hardly .35 in. long, glabrate.

SELANGOR: *Ridley* 7587.

I have seen no flowers. This may be near the group of *J. burmanica* and *J. Atkinsoni*.

7. *JUSTICIA QUADRIFARIA*, Wall. Cat. 2479 (1828-49). *Branches* 2 to 3 ft. long, little divided, pubescent. *Leaves* opposite, subequal, somewhat pubescent, at least on the midrib; blade elliptic, 2 to 4 in. long, acuminate at either end, entire; petiole 0 to .35 in. long. *Flowers* densely clustered in the axils, sometimes in small heads on short axillary peduncles; bracts (rather floral leaves) spatulate, rusty-pubescent, occasionally present. *Sepals* .25 in. long, linear, pubescent. *Corolla* .25 to .35 in. long, white with rose spots. *Stamens* 2; anther-cells 2, one below the other, tailed; style glabrous. *Capsule* .25 in. long, glabrate or minutely pubescent; solid pedicel very short; seeds 4, verrucose-tubercular. T. Anders. in Journ. Linn. Soc. IX. 514 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 530; Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 349; Hemsl. in Journ. Linn. Soc. XXVI. 246 (1890). *J. Zollingeriana*, C. B. Clarke, l. c. *Gendarussa quadrifaria*, Nees in Wall. Pl. As. Rar. III. 105. *Adhatoda quadrifaria* and *Neesiana*, Nees in DC. Prodr. XI. 396.

SINGAPORE: *Hullett* 156. SELANGOR: *Curtis*.—DISTRIB. Khasia, Tenasserim, Sumatra, China.

8. *JUSTICIA NEESIANA*, T. Anders. in Journ. Linn. Soc. IX. 513 (1867). *Leaves* oblong or linear-lanceolate, 1.5 by .25 in. in the type examples, but (in Wray 3538) attaining 4 by .75 in. *Sepals* hardly .175 in. *Corolla* .25 in. long. Otherwise as *J. quadrifaria*, Wall. C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 531. *Gendarussa Neesiana*, Wall. Cat. 7175; Nees in Wall. Pl. As. Rar. III. 105. *Adhatoda Neesiana*, Nees in DC. Prodr. XI. 397.

PERAK: *Scortechini* 38, 1304; alt. 300 ft., *Wray* 3538. BUNGAL R.: *Lobb*.—DISTRIB. Amherst.

Scortechini, n. 38, and *Lobb*'s example agree with the Wallichian Amherst plant. *Wray*'s example is much larger, and from description is not separable from *J. salicifolia*, T. Anders. (see Fl. Br. Ind. IV. 531), a Khasia plant, which, however, it does not match. As stated in the Fl. Br. Ind. IV. 530, *J. Neesiana* should be esteemed only a var. of *J. quadrifaria*.

9. *JUSTICIA HENICOPHYLLA*, C. B. Clarke, n. sp. A herb, 1·5 to 4 ft. high, nearly glabrous. *Leaves* apparently alternate, attaining 9 by 3·5 in., often only half these dimensions, elliptic or ovate, acuminate, acute; base cuneate, not rarely unequal, with one side rounded or almost cordate; primary nerves 7 pairs; petioles 0 to ·25 in. long. *Inflorescence* of axillary peduncled cymes, sometimes small few-flowered, sometimes compound 40-flowered (but less than half the length of the leaf); bracts and prophylla minute. *Sepals* 5, linear, ·175 in. long, pubescent. *Corolla* a greenish cream-colour, the palate marked with rose-purple, ·35 in. in length, pubescent without; altogether as of a *Justicia*. *Stamens* 2; filaments glabrous; cells of anthers 2, ellipsoid, one (half its length) below the other with a white tail; pollen ellipsoid, 30 μ long, with 2 stopples, and a longitudinal row of patches on either side of each stopple. *Style* hairy, shortly 2-fid at top. *Capsule* ·7 in. long, glabrate; base cylindric, with 4 seeds in the upper (widened) part; seeds glabrous, granular-scabrid.

The numerous examples here collected may include more species than one; some (King's Collector 2189, Curtis 1342) have dried green; others (*Wray* and *Scortechini*) have dried red tinged black. The leaves in some are shortly acuminate, in others long acuminate. The base of the leaf varies greatly on one branch.

PERAK: *Curtis* 1342; *Wray* 1402, 2751; *Scortechini*; alt. 500 ft., *King's Collector* 2189, 10297.

VAR. β *caudata*, C. B. Clarke. *Leaves* very unequal at the base; the tip caudate, curved on one side.

PERAK: *Goping*, alt. 500 to 800 ft., *King's Collector* 4349.

VAR. γ *scandens*, C. B. Clarke. "A slender creeper, 20 to 25 ft. high." *Leaves* at the base nearly equal-sided, cuneate.

PERAK: *Goping*, alt. 300 to 500 ft., *King's Collector* 6058.

10. *JUSTICIA SUBALTERNANS*, C. B. Clarke, n. sp. A much-branched shrub, 2 to 4 ft. high, nearly glabrous. *Leaves* opposite, rarely subequal, one of each pair often wanting or less than ·125 in. long; nearly sessile, 1-sided, curved, shining, 4 by 1·25 in. long, acuminate, acute, minutely scabrous on the midrib beneath. *Inflorescence* of peduncled, axillary, short cymes. *Sepals* ·125 in. long, lanceolate, pube-

scent. *Stamens* 2; one anther-cell below the other, white-tailed. The flowers and inflorescence much as of *J. hemicophylla*.

PERAK: Kinta, alt. 300 to 800 ft., *King's Collector* 7061.

11. *JUSTICIA ALTERNIFOLIA*, C. B. Clarke, n. sp. Shrub, 2 to 3 ft. high, with hairy stem. *Leaves* all alternate (*i. e.* one of each pair $\cdot 1$ in. long, early deciduous); lamina ovate, oblique, acute, 7 by $3\cdot 5$ in., very unequal at the base; primary nerves 8 to 9 pairs, hairy on the under side of the leaf; petioles $\cdot 1$ to $\cdot 25$ in. long. *Inflorescence* of small, short-peduncled, pubescent, axillary, few-flowered cymes; bracts and prophylla inconspicuous. *Capsule* $\cdot 7$ in. long, hairy, cylindric at base, with 4 seeds at the top.

PERAK: alt. 500 to 700 ft., *King's Collector* 10680.

The corolla has not been seen. This can hardly be a species of *Hallieracantha*, as the cyme is too open and the calyx too small for that genus.

12. *JUSTICIA OTOPHORA*, C. B. Clarke, n. sp. Nearly glabrous. *Branches* slender, round, zigzag. *Leaves* sessile, one of each pair reduced to an ovate persistent ear $\cdot 25$ to $\cdot 35$ in. long; the other $4\cdot 5$ by $1\cdot 35$ in., elliptic; base unequal, rounded on one side; tip caudate-ligulate. *Peduncles* $\cdot 5$ to 1 in. long, axillary, carrying small few-flowered cymes. *Sepals* $\cdot 175$ in. long, linear-lanceolate, nearly glabrous. *Capsule* $\cdot 7$ in. long, glabrate, cylindric at the base, with 4 seeds in the top.

PERAK: *Scortechini*.

The anther-tails have not been seen; it is inferred from the small calyx and the peduncled cymes that the genus is *Justicia* (alternate-leaved section), and not *Hallieracantha*.

13. *JUSTICIA GENDARUSSA*, Linn. f. Suppl. 85 (1781). Erect, 2 to 4 ft. high. *Leaves* 4 by $\cdot 75$ in., lanceolate, glabrous, entire or undulate; petioles $\cdot 25$ in. long. *Spikes* (condensed panicles) 2 to 5 by $\cdot 75$ in., terminal, sometimes paniced; flowers clustered; floral leaves 0; bracts $\cdot 125$ to $\cdot 175$ in., linear. *Sepals* 5, linear, viscous-pubescent, $\cdot 175$ in. long. *Corolla* $\cdot 5$ in. long, white or rose-purple, pubescent without or nearly glabrous. *Stamens* 2; one anther-cell a little below the other, tailed; pollen $30\ \mu$ long, ellipsoid, with 2 longitudinal rows of patches beside each stopple. *Capsule* $\cdot 5$ in. long, clavate, glabrous, 4-seeded. Blume Bijdr. 785; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 532; Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 347, t. 139, fig. D; Hemsl. in Journ. Linn. Soc. XXVI. 245 (1890); Ridley in Trans. Linn. Soc. ser. 2, Bot. III. 333 (1893), and in Journ. As. Soc. Straits, 122 (Singapore 1900); Prain Beng. Plants, 817, 818. *Gendarussa vulgaris*,

Nees in Wall. Pl. As. Rar. III. 104; Wight Ic. t. 468; Moritsi Verz. Zoll. Pl. 47; Hassk. Cat. Hort. Bogor. 151; Miq. Fl. Ind. Bat. II. 831.

PENANG: *King's Collector* 1461; *Deschamps*; *Curtis* 791. MALACCA: *Griffith*. PERAK: alt. 500 ft., *King's Collector* 8682. DINDINGS: Pangkore, *Scortechini* 208, 950.—DISTRIB. South-east Asia; largely cultivated.

The Malay Peninsula material may be all from cultivated plants; none shows a capsule. Ridley, *l. c.*, observes that it seems never to fruit, and that he knows it only from gardens or remains of cultivation.

14. *JUSTICIA MAINGAYI*, C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 534 (1885). A small shrub, with weak branched stems 2 ft. long. Leaves 4 by .35 to 1.25 in., nearly glabrous, entire or undulate-crenate; tip acuminate; base cuneate; upper surface with raphides; petiole .2 in. Spikes terminal and axillary, 2 to 3 in. long, linear, peduncled, often 2 to 3 paniced on one peduncle; flowers mostly solitary, distant; bracts and prophylla minute. Sepals .175 in. long, lanceolate-linear, pubescent. Corolla .5 in. long, pubescent without, nearly as of *J. vasculosa*. Stamens 2; filaments glabrous; anther-cells 2, ellipsoid, one below the other with a white tail. Pollen oblong-ellipsoid. Capsule .35 in. long, 4-seeded at the top.

PENANG: *Maingay* (K.D.) 1181.

15. *JUSTICIA VASCULOSA*, Wall. Cat. 2469 (1826). Branches 8 to 20 in. long, dividing, rather weak. Leaves ovate to narrow-elliptic, attenuate at either end, up to 5 by 2 in., nearly glabrous; petiole .5 in. long. Spikes 2 to 4 in. long, linear or oblong, terminal and axillary, often clustered or subpaniculate; flowers distant, opposite, sessile, solitary or sometimes clustered; floral leaves often 0, sometimes several, narrow-lanceolate, .5 in. long, green, scattered about the lower portion of the spike; bracts and prophylla very small, pubescent. Sepals .175 in. long, linear-lanceolate, pubescent. Corolla .5 in. long, yellow; the mouth pink-spotted; upper lip oblong entire, lower pendent. Stamens 2; filaments glabrous; anther-cells 2, round-ellipsoid, one below the other, with a white knob at the base; pollen 40 μ long, ellipsoid, with 2 stopples and longitudinal rows of tubercles beside them. Pistil glabrous, except a few hairs near the base of the style. Capsule .6 in. long, with 4 seeds in the upper part, glabrate. T. Anders. in Journ. Linn. Soc. IX. 515 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 533. *Ruellia rivinaefolia*, Wall. Cat. 2413. *Gendarussa vasculosa*, Nees in Wall. Pl. As. Rar. III. 104. *Adhatoda vasculosa*, Nees in DC. Prodr. XI. 407.

PENANG: *Curtis*. PAHANG: *Ridley* 2183. SINGAPORE: *Ridley* 3165.—DISTRIB. Eastern India, plentiful, from Assam to Tenasserim; Sumatra.

16. *JUSTICIA UBER*, C. B. Clarke, n. sp. Stem 3 to 4 ft. high. Leaves opposite, subequal; blade up to 10 by 3 to 4 in., elliptic or subovate, lanceolate acuminate at tip, cuneate at base; margin undulate; upper surface glabrate, lower paler, obscurely pubescent; raphides none or obscure; nerves 8 pairs, oblique: upper petioles .5 in. long. Spikes terminal and on axillary peduncles, sometimes paniced, dense, nearly always 1-sided, 1 to 3 by .5 in.; bract and prophylla .175 in. long, narrow-lanceolate, nearly glabrate. Sepals .175 in. long, narrow-lanceolate, nearly glabrous. Corolla greenish-yellow, .6 in. long, somewhat hairy without. Stamens 2; one anther-cell much below the other, with a white tail. Capsule .6 in. long, stalked, 4-seeded, glabrate. Seeds flattened, verrucose, tubercled.

PERAK: *Scortechini* 96, 319; alt. 400 to 700 ft., *Wray* 386; *King's Collector* 10245; *Ridley* 9773. SELANGOR: *Ridley* 8216.

This plant flowers and fruits freely; and there is more of it in the collections than of any other *Acanth* of the Malay Peninsula.

17. *JUSTICIA SUMATRANA*, C. B. Clarke. Nearly glabrous; the inflorescence minutely pubescent. Leaves opposite, subequal; blade 6 by 3 in., broadly elliptic, entire; tip very shortly acuminate; base cuneate; nerves 7 to 8 pairs; petiole .35 in. long. Peduncles near the ends of the branches, 4 to 6 in. long, each carrying a very lax panicle of thin linear spikes 2 to 4 in. long; floral leaves 0; flowers solitary, minutely pedicelled, opposite; bract and prophylla minute. Sepals .175 in. long, lanceolate linear, viscous-scabrous. Corolla greenish-white with purple spots, .4 in. long, minutely pubescent without. Stamens 2; filaments glabrous; anther-cells ellipsoid, one below the other, with a short conic white tail; pollen 25 by 15 μ , with longitudinal series of spots. Pistil glabrate, except the base of the style. Capsule .6 in. long, nearly glabrous, 4-seeded in the upper part; seeds cerebro-tubercular. *Gendarussa ? sumatrana*, Miq. Fl. Ind. Bat. II. 832.

PERAK: *Scortechini* 340; *Wray* 1596.—DISTRIB. Sumatra (*Teijsmann*).

This species is allied to *J. flaccida*, Kurz, but the petioles are not eared at base; the flowers are much smaller.

18. *JUSTICIA PROCUMBENS*, Linn. Sp. Pl. 15 (1753). Annual, much branched, decumbent or procumbent. Branches slender, quadrangular. Leaves elliptic or oblong, 1 to 2 in. long, glabrous or hairy, short-

petioled. *Spikes* cylindric, continuous, hirsute; bracts linear-lanceolate, .175 in. long. *Sepals* 4, linear, .175 in. long, hirsute. *Corolla* .25 to .35 in. long, white pink-spotted. *Stamens* 2; anthers 2-celled; one cell below the other, tailed. *Capsule* .25 in. long, 4-seeded nearly from the base. Benth. Fl. Austral. IV. 549; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 532; Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 349; Hemsl. in Journ. Linn. Soc. XXVI. 246 (1890). *J. diffusa*, Prain Beng. Plants 818. *Rostellaria procumbens*, Nees in Wall. Pl. As. Rar. III. 101. *Rostellularia procumbens*, Nees in DC. Prodr. XI. 371; Moritsi Verz. Zoll. Pfl. 47; Miq. Fl. Ind. Bat. II. 826.

PENANG: *Curtis* 3099.—DISTRIB. South India; Australia.

The group to which *J. procumbens* belongs may be esteemed to form but one species; in which case its area would include all South and East Asia.

27. ADHATODA, Nees.

Spikes strobilate; the large bracts imbricated, green. *Stamens* 2; anther-cells 2, oblong, at nearly equal height, at the base subacute or with a minute knob, not tailed. Otherwise as *Justicia*.—DISTRIB. Species, the present common one; with which 6 or 8 other plants from Tropical Africa have been generically associated.

This plant resembles altogether the bracteate section of *Justicia* with strobilate spikes, except that the anther-cells have not at their base the characteristic white anther-tail.

1. ADHATODA VASICA, Nees in Wall. Pl. As. Rar. III. 103 (1832). A dense shrub, 3 to 8 ft. high. *Leaves* 8 by 3 in., elliptic, acute at either end, entire, minutely pubescent; petioles 1 in. long. *Peduncles* 1 to 6 in. long, from the upper axils of the branches. *Spikes* strobilate, 2 to 6 in. long; bracts ovate, green, entire, .75 by .25 in.; prophylla up to .5 by .125 in. *Sepals* .3 to .35 in. long, lanceolate. *Corolla* white, purple-spotted, 1.25 in. in total length; tube short, widened above the base. *Capsule* .75 in. long, stout, clavate, pubescent, with 4 rough seeds at the top. C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 540 (*with syn.*); Prain Beng. Plants 819. *Justicia Adhatoda*, Linn. Sp. Pl. ed. i. 15, ed. ii. 20; Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 349; Hemsl. in Journ. Linn. Soc. XXVI. 244 (1890); Ridley in Journ. As. Soc. Straits 122 (Singapore 1900). *Gendarussa Adhatoda*, Hassk. Cat. Hort. Bog. 151.

PENANG: *Curtis* 1017. SINGAPORE: *fide* Hook. f. Fl. Br. Ind. IV. 540.—DISTRIB. Throughout India, extending to Malaya; commonly cultivated.

28. RHINACANTHUS, Nees.

Erect or rambling herbs. *Leaves* entire; margins often undulate. *Flowers* in subsessile distant clusters on the branches of the panicle; bract and prophylla very small, linear. *Sepals* 5, linear, very small, hairy. *Corolla* 2-lipped; tube linear, longer than the lips; anticus lip patent, deeply 3-lobed; posticus lip narrowly oblong-linear, emarginate, curved and curled. *Stamens* 2; shortly exserted; anther-cells 2, one somewhat below the other, not tailed; pollen ellipsoid, longitudinally banded. *Ovary* hairy; ovules 2 in each cell; stigma shortly subequally 2-lobed. *Capsule* with cylindric stalk, and 4 seeds in the top; placenta not rising elastically. *Seeds* orbicular, flattened, black, pubescent.—
DISTRIB. Species 3 or 4, in the warm parts of Africa and India.

1. RHINACANTHUS COMMUNIS, Nees in Wall. Pl. As. Rar. III. 109 (1832). Hairy or nearly glabrous, 2 to 4 ft. high. *Leaves* opposite, subequal, ovate to lanceolate, subobtuse, entire, 2 to 5 in. long, narrowed to a petiole 0 to .35 in. long. *Panicle* large, much-branched, with small clusters of flowers on peduncles, sometimes very leafy, sometimes with few small floral leaves; bracts .125 to .25 in. long. *Calyx* .125 to .25 in. long. *Corolla* white; tube .75 in. long, linear to the top. *Capsule* .7 in. long, hairy. Usually recognized by the curled linear-oblong lip of the corolla. Hassk. Cat. Hort. Bogor. 151; Moritsi Verz. Zoll. Pfl. 48; Miq. Fl. Ind. Bat. II. 833; C. B. Clarke in Dyer Fl. Trop. Afr. V. 224 (*with syn.*); Prain Beng. Plants 819. *R. Nasuta*, Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 339, t. 135, fig. E.

PENANG: *Deschamps*; *Curtis* 2918. TONGKAH: *Curtis* 2964. MALACCA: *Griffith*.—DISTRIB. Common in the warm parts of Africa and South-east Asia.

29. LEDA, C. B. Clarke [LEPTOSTACHYA, Nees, *partim*].

Herbs. *Panicle* loose; branches long, linear, with distant flowers solitary or in clusters in the typical form; bracts inconspicuous. *Stamens* 2; anther-cells 2, the lower without a tail, at equal height parallel, or one lower somewhat divaricate; pollen ellipsoid, with 2 stopples, the longitudinal rows of patches on either side of each stopple prominent or obsolete. Otherwise as *Justicia*, Sect. *Gendarussa*.—
DISTRIB. Species 12, in South-east Asia.

The seventy American species, among which stands *Dianthera*, Linn., differ greatly in habit among themselves and from the Indian. The genus *Dianthera* is sunk in *Justicia* by Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 346, which then has three hundred species and is inconveniently large. But the Indian *Dianthera* only differs from *Justicia vasculosa*, Wallich, and its neighbours by the absence of a white tail to the lower anther-cell.

Panicle very open, with long linear branches:—

Leaves rounded or sometimes cordate at base..	..	1. <i>L. subcordata</i> .
Leaves obovate, attenuate at base..	..	2. <i>L. obovata</i> .
Panicle almost dense, oblong, hardly 1 in. broad	..	3. <i>L. densiflora</i> .
Panicle reduced to two or three flowers	..	4. <i>L. radicans</i> .
Terminal spikes simple; flowers solitary	..	5. <i>L. andrographioides</i> .

1. *LEDA SUBCORDATA*, C. B. Clarke, n. sp. Nearly glabrous; the innovations and inflorescence minutely pubescent. *Stem* 1 to 2 ft. long, divided, rambling, sometimes decumbent and rooting at the lower nodes (then with smaller leaves). *Leaves* opposite, subequal; blade 3·5 by 1·5 in., elliptic, acuminate, entire; base rounded or slightly cordate; petioles 1 in. long. *Panicles* terminal on the slender branches, and with few distant subsolitary flowers; bracts and prophylla minute. *Sepals* ·125 in. long, linear. *Corolla* white, ·5 in. long; tube straight, narrowly funnel-shaped. *Stamens* 2; anther-cells 2, parallel, at equal height, rounded at base; pollen 45 by 30 μ , with 2 stopples and 2 longitudinal bands on either side each stopple. *Style* glabrate.

PERAK: *King's Collector* 970; *Scortechini* 95; *Curtis* 3153.

This species is close to the Khasia *L. debilis*, C. B. Clarke sub *Dianthera*, in which the flowers are in approximate, sessile, opposite pairs, forming long linear spikes.

2. *LEDA OBOVATA*, C. B. Clarke, n. sp. Nearly glabrous; the inflorescence minutely pubescent. *Stem* 1 foot or more. *Leaves* opposite, subequal; blade 5·5 by 2·25 in. obovate, with a very short acumination, entire, with many raphides, long decurrent at base; petiole hardly ·5 in. long. *Panicle* terminal, long-peduncled, with few long linear branches; bracts and prophylla minute; the branches very narrow thinly flowered racemes; pedicels ·06 in. long, or occasionally 2 to 3 flowers clustered. *Sepals* ·125 in. long, linear, acute. *Corolla* ("yellow" in Ridley's example) ·5 in. long; tube straight, narrowly funnel-shaped. *Stamens* 2; anther-cells 2, parallel, one placed at one-third of its length below the other, rounded at base; pollen ellipsoid with longitudinal bands. *Capsule* (young) ·7 in. long, with a linear stalk, pubescent.

PERAK: *Scortechini* (type of species). SELANGOR: *Ridley* 7592 (an imperfect specimen; appears to match).

This species is near *Dianthera leptostachya*, Benth.

3. *LEDA* (?) *DENSIFLORA*, C. B. Clarke, n. sp. Glabrous. *Stems* 8 in. long, decumbent at base. *Leaves* opposite, equal, some 5 by 1 in., lanceolate, some 5 by 1·5 in, elliptic-lanceolate; nerves 7 to 8 pair, patent; raphides many, small on both surfaces; margin undulate; base cuneate to a petiole ·25 in. long. *Inflorescence* terminal; peduncle ·5 in. long;

panicle 2 by 1 in., many-flowered; pedicels 0 to .1 in. long; bracts and prophylla minute or 0. *Sepals* .06 in. long, lanceolate, glabrous. *Corolla* .5 in. long, yellow, straight, funnel-shaped, deeply 2-lipped. *Stamens* 2; filaments long, glabrous; anther-cells 2, oblong, parallel at equal height, obtuse at base, microscopically hairy; pollen ellipsoid, with 2 pores and 2 longitudinal lines of patches beside each stopple. *Capsule* .75 in. long, slender, glabrous, with 4 seeds in the upper half.

PERAK: Ridley 7165.

This plant satisfies the technical characters of *Leda*, but the habit and inflorescence are those of *Eranthemum*.

4. *LEDA RADICANS*, C. B. Clarke, n. sp. Creeping, rooting. *Stems* 10 in. long, divided, minutely pubescent. *Leaves* opposite, equal; blade ovate, 1.5 in. long, subentire, with many small raphides, rhomboid or nearly rounded at the base; petioles .25 to .5 in. long. *Inflorescence* terminal, depauperated, of 2 to 3 distant flowers. *Sepals* .125 to .175 in. long, linear, somewhat pubescent. *Corolla* nearly .5 in. long, as of *Dianthera*. *Stamens* 2; filaments glabrous; anther-cells 2, nearly at equal height, muticous; pollen short-ellipsoid, 25 μ long, with 2 stopples, obscurely marked longitudinally. *Pistil* glabrous.

PERAK: Ulu Salami, *Scortechini* 129.

The material for this plant is scanty, and the genus doubtful.

5. *LEDA ANDROGRAPHIOIDES*, C. B. Clarke. Nearly glabrous. *Stems* about 1 ft. high, weak. *Leaves* 3 in. long, elliptic, acuminate; petioles .25 to .5 in. long. *Spikes* 2 to 3 in. long, terminal, solitary; flowers solitary, opposite, in distant pairs; bracts inconspicuous. *Sepals* .125 in. long, linear-lanceolate, nearly glabrous. *Corolla* .5 in. long or rather more; tube cylindric, straight; lips short. One anther-cell below the other, with a minute callus at the base; hardly tailed. *Justicia andrographioides*, C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 534; Ridley in Journ. As. Soc. Straits 121 (Singapore 1900).

SINGAPORE; fide Ridley.—DISTRIB. Tenasserim.

30. *POLYTREMA*, C. B. Clarke, n. gen.

Slender undershrubs. Opposite pairs of *leaves* equal or unequal. *Inflorescence* in small, few-flowered, axillary cymes; bracts inconspicuous. *Calyx*-lobes 5, linear. *Corolla* small, 2-lipped. *Stamens* 2; anther-cells 2, oblong, standing a little apart, one slightly below the other, having its base muticous or sometimes acute, not tailed. *Pollen* globose or obscurely trigonous-globose, without (or with very obscure) longitudinal bands, surface smooth or most minutely uniformly granu-

lar; stopples 4 in the typical species, possibly 4 to 3 in other species. *Capsule* stalked, with 4 seeds.—*DISTRIB.* Species: the 3 here described and 1 in the Philippines.

A group of species resembling in habit some of the Malay plants referred to *Ptysiglottis* by Hallier f. in Nova Acta Leop. Carol. Akad. 70 (1897) (as *P. lan- ceolata*, Hallier f. l.c. 221, t. 15, fig. 1, or *P. frutescens*, Hallier f. l.c. 222, t. 16, fig. 2), which have ellipsoid pollen longitudinally banded and anther-cells approximated. The type *Ptysiglottis* from Ceylon is remote in habit and has approximated anther-cells.

Leaves of opposite pairs (many of them) very unequal:—

Leaves entire; sepals .35 in. long	1. <i>P. vulgare</i> .
Leaves finely crenulate; sepals .2 in. long	2. <i>P. crenulatum</i> .
Leaves of opposite pairs equal or very nearly so	3. <i>P. isophyllum</i> .

1. *POLYTREMA VULGARE*, C. B. Clarke, n. sp. Nearly glabrous; branches round, somewhat zigzag. *Leaves* opposite, one reduced to an ovate auricle .25 to .5 in. long, the other elliptic or broadly elliptic, 4 to 6 in. long, entire, covered with small raphides; tip acuminate; base rhomboid not rounded; primary nerves 10 to 11 pair; petiole 0 to .175 in. long. *Cymes* few-flowered, small, sessile or very nearly so in the axils; bracts and prophylla hardly any. *Sepals* .35 in. long, setaceous, minutely pubescent or nearly glabrous. *Corolla* .7 in. long; tube inflated in the upper half. *Stamens* 2; anther-cells 2, muticous, distant, one rather the lower. *Style* glabrous. *Capsule* .7 in. long, glabrate, with 4 seeds in the upper part.

PERAK: *Ridley* 7164, 9445, 9768; *Wray* 3591 (partly); Goping, *King's Collector* 486. SELANGOR: *Ridley* 8545.

2. *POLYTREMA CRENULATUM*, C. B. Clarke, n. sp. *Branches* 6 to 8 in. long, decumbent, much divided. *Leaves* up to 2.5 by 1 in., subsessile, elliptic-acuminate; margin finely crenulate. *Cymes* closely axillary, 1- to 3-flowered. *Sepals* .2 in. long, linear-setaceous, nearly glabrous. *Corolla* .35 in. long. Otherwise as *P. vulgare*.

PERAK: *Scortechini* (two collections without number).

This is possibly only a starved form of *P. vulgare*, but it is considerably smaller in every part.

3. *POLYTREMA ISOPHYLLUM*, C. B. Clarke, n. sp. Herb, 1 to 2 ft. high, nearly glabrous. *Leaves* opposite, equal, yellow when dry; blade 4.5 by 1.75 in., elliptic-acuminate; base cuneate, entire, covered with raphides; primary nerves 7 to 8 pair; petioles .5 to 1 in. long. *Cymes* small, few-flowered, closely axillary. *Sepals* .35 in. long, setaceous, minutely pubescent. *Corolla* white, more than .5 in. long. *Stamens* 2; filaments glabrous; anther-cells rather long, not tailed,

distant but nearly parallel, one (for one-third its length) below the other. *Pistil* glabrous.

PERAK: *Scortechini* 224.

31. ECBOLIUM, Kurz.

Spikes strobilate; bracts imbricate, enclosing the calyx. *Corolla*-tube linear. *Stamens* 2, without rudiments; anther-cells 2, narrowly oblong, at equal height, muticous; pollen globose, with meridional bands. *Capsule* stalked, with 4 large flat seeds in the round head. Otherwise as *Justicia*.—DISTRIB. Species 12 in the warm parts of Africa, Madagascar, Arabia, and India.

This genus resembles the section *Bracteate* of *Justicia*, which has similar strobilate spikes; it differs in having the anther-cells at equal height and without tails. It is difficult to say by what character it differs from some of the American species of *Dianthera*; but the Malay *Diantheræ* (*Leda*) have all very small bracts.

1. ECBOLIUM LINNEANUM, Kurz in Journ. As. Soc. Beng. XL. ii. 75 (1871). A small shrub, glabrate; the inflorescence somewhat pubescent. *Leaves* opposite, equal, elliptic or obovate, acute, 3 to 6 in. long; base cuneate; petiole .5 to 1.5 in. *Spikes* strobilate, 2 to 6 in. long, terminal and on axillary peduncles; bracts ovate, .5 in. long, green, varying in their margin, which is sometimes serrate, sometimes quite entire, rounded at the tip; prophylla 2, minute. *Sepals* .2 in. long, narrow. *Corolla* green-blue; tube .75 to 1 in. long, linear to the top; lips .35 to .5 in. long. *Capsule* .75 in. long; stalk narrowly cylindric; head round, flat, .3 in. in diam., containing 2 large, round, thin, rough seeds. Boiss. Fl. Orient. IV. 526; Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 338; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 544, and in Dyer Fl. Trop. Afr. V. 236 (*with syn.*); Prain Beng. Plants 816.

PENANG: *King's Collector* 1671. MALACCA: *Maingay* (K.D.) 1172. SINGAPORE: *Deschamps*.—DISTRIB. Common in warm Africa and India; not yet known from the Malay Archipelago.

Recognized by its green-blue corolla, or by the broad head to the capsule.

32. GRAPTOPHYLLUM, Nees.

Glabrous shrubs. *Leaves* equal, opposite, entire. *Panicles* terminal, dense, oblong; bracts and prophylla very small. *Corolla* large, red; tube narrowly funnel-shaped, curved; otherwise nearly as *Ecbolium*.—DISTRIB. Species 3, whereof 1 is widely spread in the warm regions of the Old World, and 2 in Australia.

The red corolla has a much broader tube than that of *Ecbolium*. The much-cultivated species here described is not confounded with *Ecbolium*, but is marked

sometimes *Justicia*, from which it differs by the anther-cells at equal height, not tailed.

1. *GRAPTOPHYLLUM HORTENSE*, Nees in Wall. Pl. As. Rar. III. 102 (1832). Attains 6 to 8 ft. in height. *Leaves* broadly elliptic, 5 to 9 in. long, cuneate at either end; petiole hardly .25 in. *Panicle* narrowed nearly to a raceme, terminal, subsessile, 10- to 40-flowered; bracts and prophylla inconspicuous. *Sepals* .175 in. long. *Corolla* red; tube .75 in. long; lips .5 in. long. Hassk. Cat. Hort. Bogor. 150; Moritzi Verz. Zoll. Pf. 47; Miq. Fl. Ind. Bat. II. 824; C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 545, and in Dyer Fl. Trop. Afr. V. 241 (*with syn.*). *G. pictum*, Griff. Notul. IV. 139; Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 327.

PERAK: *Scortechini* 1545. KEDAH: *King's Collector* 1765. Wild probably in the Malay Archipelago, where it is plentiful. Frequent in India, also in Guinea, where it is almost certainly introduced.

33. PERISTROPHE, Nees.

Erect branched herbs. *Leaves* opposite, subequal, petioled. *Flowers* 1 to 4 together, and of these one or more often imperfect, clustered between 2 floral leaves; the flower-clusters often peduncled, axillary or terminal; bract and prophylla to each flower small or 0. *Calyx* small, deeply lobed into 5 subequal lanceolate teeth. *Corolla* rose or purple; tube slender; limb 2-lipped; upper lip subentire, lower subequally 3-lobed. *Stamens* 2; filaments pubescent below; anther-cells 2, muticous, narrow, curved, one half its length above the other; pollen short-ellipsoid, longitudinally banded. *Ovary* 4-ovulate; style filiform, minutely bifid. *Capsule* ellipsoid, stalked, minutely pubescent; placenta not rising elastically from the base; seeds granular, subtubercular.—
DISTRIB. Species 25, but several very close together, extending from Africa to Japan and New Caledonia.

Floral leaves ovate triangular, .5 in. broad; corolla 1.25 in. long 1. *P. tinctoria*.

Floral leaves broadly lanceolate, .175 in. broad; corolla .75 in. long 3. *P. salicifolia*.

Floral leaves linear-ligulate, .06 to .09 in. broad; corolla .75 to

1 in. long 2. *P. acuminata*.

These three species are very closely allied, as are all species admitted of this group by Nees and Miquel. *P. montana*, Nees, *P. angustifolia*, Nees, *P. salicifolia*, Blume, *P. commutata*, Nees, are not improbably natives of the Malay Peninsula, but are included between *P. tinctoria* and *P. acuminata*.

1. *PERISTROPHE TINCTORIA*, Nees in Wall. Pl. As. Rar. III. 113 (1832). Often 3 to 4 ft. high. *Leaves* 3.5 by 1.75 in., cuneate at either end, entire, sparingly pubescent; petioles .25 to 1 in. long. *Peduncles*

·25 to 1 in. long, several often approximated, subpanicled, often glabrate. *Floral leaves* ovate-triangular, large, up to 1 by ·5 in.; margins not ciliate, but (more or less) minutely scabrid. *Calyx* ·175 to ·2 in. long, grey, hairy; teeth lanceolate. *Corolla* 1·25 in. long. *Anthers* ·175 in. long. *Capsule* ·6 in. long. C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 556; Hemsl. in Journ. Linn. Soc. XXVI. 248 (1890); Prain Beng. Plants 820. *P. pallida*, Nees in DC. Prodr. XI. 494; Miq. Fl. Ind. Bat. II. 846; Ridley in Trans. Linn. Soc. ser. 2, III. 334 (1893).

JOHORE: *Ridley*. KRIAN: *Scortechini* 1373. SINGAPORE: *Scortechini* 370, 816.—DISTRIB. Cultivated much in South-east Asia.

P. fera, C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 556, is possibly the wild form of *P. tinctoria*, and hardly differs from it but by having the floral leaves ciliate on the margins. This plant is (partly) described as *P. tinctoria* by Nees and Miquel; I have seen no example of it from the Malay Peninsula.

2. *PERISTROPHE ACUMINATA*, Nees in Wall. Pl. As. Rar. III. 113 (1832). Smaller than *P. tinctoria*, Nees, in all its parts. *Floral leaves* ·5 by ·06 to ·09 in. broad, glabrous. *Corolla* ·75 to 1 in. long. *Capsule* ·5 in. long. Nees in DC. Prodr. XI. 496; T. Anders. in Journ. Linn. Soc. IX. 521 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 555; Lindau in Engl. & Prantl Pflanzenfam. IV. 3 B, 331; Ridley in Trans. Linn. Soc. ser. 2, III. 334 (1893), and in Journ. As. Soc. Straits 122 (Singapore 1900). *P. Blumeana*, Hassk. Cat. Hort. Bogor. 152; Nees in DC. Prodr. XI. 495; Miq. Fl. Ind. Bat. II. 848. *Justicia Roxburghiana*, Blume Bijdr. 786, *fide* Miquel.

PENANG: *Deschamps*, *Curtis* 681. PAHANG: *Ridley* 1165. PERAK: *Scortechini* 14, 146; *King's Collector* 285. MALACCA: *Griffith*; *Harvey*; *Curtis* 254; *Goodenough*. SINGAPORE: *Hullett* 93. PEKAN: *fide* Ridley.—DISTRIB. Eastern India, Burma, Java.

3. *PERISTROPHE SALICIFOLIA*, Miq. Fl. Ind. Bat. II. 847 (1856). *Leaves* oblong-lanceolate, often 3 by ·5 in., rarely elliptic-lanceolate, often long acuminate. *Floral leaves* ·6 by ·175 in. (or broader). *Corolla* ·75 in. long. *Capsule* ·5 in. long. *Justicia salicifolia*, Blume Bijdr. 787. *Hypoestes salicifolia*, O. Kuntze Revisio I. 491 (1891).

PENANG: *Deschamps*; *King's Collector*; *Ridley* 9375. PERAK: *Scortechini*; *Wray* 847.—DISTRIB. Java.

This species is separated here from *P. acuminata* by the sole character of broader bracts, and I doubt its specific distinctness. It is a curious coincidence that O. Kuntze should have named his plant (which is at Kew) *salicifolia*, as he did not intend it to be = Blume's *Justicia salicifolia*.

34. *HYPOESTES*, R. Brown.

Erect branched herbs or shrubs. *Leaves* opposite, subequal, petioled. *Flowers* paired, one of these often imperfect or wanting; the two bracts connate (in the Malay species) into an obconic or cylindric involucre; prophylla to the lower bract inside the involucre usually longer than the calyx; prophylla to the upper bract often 0; involucre often numerous, in heads, dense panicles or racemes. *Calyx* shorter than the involucre, deeply lobed; teeth 5, lanceolate. *Corolla* rose-purple; tube linear; lips 2, narrow. *Stamens* 2; anthers of 1 cell, muticous; pollen ellipsoid, longitudinally striate. *Ovary* 4-ovulate; style glabrate upwards, shortly bifid. *Capsule* oblong or ellipsoid, stalked, 4-seeded; placentæ not rising elastically from the base of the capsule; seeds glabrous, tuberculate-granular.—*DISTRIB.* Species 40, mostly in Africa and Mascarenia; 8 species are described by Miquel from Malaya, but these 8 are so closely allied that they might be described as 2.

The genus *Hypoestes* abounds in the Malay Archipelago, and the quantity of material from thence is very large. In India, again, *Hypoestes* is frequent. But from the Malay Peninsula I have only seen one collection, viz. Maingay 1176, here described.

1. *HYPOESTES MALACCENSIS*, Wight Ic. 1555 (before 1850). Pubescent, branched, 1 to 2 ft. high. *Leaves* up to 3 by .8 in., elliptic-lanceolate, narrowed at either end, entire, petiole .5 in. long. *Involucre*s in axillary and terminal ovoid clusters 1 in. long; involucre .8 in. long, shortly conic at base, with 2 linear teeth. *Calyx* .25 in. long, minutely thinly hairy. *Corolla* .75 in. long. *Pollen* with 3 stopples. T. Anders. in Journ. Linn. Soc. IX. 522 (1867); C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 558; Lindau in Engl. & Prantl Pflanzenfam. IV. 3B, 333. *H. rosea*, Dcne. in Nouv. Ann. Mus. III. 381 (Paris 1834) (*non* Beauv.).

MALACCA: Griffith; Capt. A. C. Wight; Maingay (K.D.) 1176.—*DISTRIB.* Malay Islands.

With this is united (in Fl. Br. Ind. IV. 558) the Malay Archipelago species *H. Decaisneana*, Nees, and *H. laxiflora*, Nees, which differ very little.

35. *RUNGIA*, Nees.

Small undershrubs or herbs. *Leaves* opposite, equal. *Flowers* in peduncled spikes; floral leaves sometimes strobilate, including two bracts; lower bract longer than the calyx, upper smaller, sterile, nearly always empty. *Sepals* 5, nearly separate, linear. *Corolla* small, 2-lipped; tube oblong, short; lobes imbricated in the bud. *Stamens* 2;

1 anther-cell below the other usually appendaged; pollen ellipsoid, longitudinally banded. *Ovary* 4-ovulate; style at tip emarginate. *Capsule* small, with 4 or 2 seeds; placentæ rising elastically with the seeds, from the base of the capsule; seeds glabrous, minutely tuberculate.—**DISTRIB.** Species 35, mainly in India, extending to China, Australia, and Africa.

This genus can be separated from the small species of *Justicia* by the fruit.

1. *RUNGIA LAXIFLORA*, C. B. Clarke. Suberect, 3 ft. high, nearly glabrous. *Leaves*: lamina 3·5 by 1·25 in., elliptic, narrowed at either end; petioles ·25 to 1 in. long. *Spikes* 2 to 4 in. long, linear, flexuose, very lax; the outer bracts often scarcely imbricated. *Bract* (floral leaf) 9 mm. long, narrow-lanceolate, with scarious margins; the two prophylla lanceolate with scarious margins, the lower ·3 in. long, the upper sterile, smaller. *Sepals* ·275 in. long, linear, glabrous. *Corolla* ·6 in. long, "pale yellow, striped with light grey" (Collector's note). *Stamens* 2; lower anther-cell smaller than the upper, with a white spur; pollen 50 μ long, with 3 stopples. *Style* glabrous, minutely hairy near the base. *Capsule* ·35 in. long; minutely hairy; placentæ rising elastically; seeds minutely tubercled. ? *Justicia laxiflora*, Blume Bijdr. 789.

PERAK: *Scortechini*; Larút, alt. 3000 ft., *King's Collector* 3676; alt. 100 ft., *King's Collector* 1815.—**DISTRIB.** Java (?).

Justicia laxiflora, Blume, has the filament "antice barbata," and could hardly be this. It was Zollinger, n. 1539 *sic* Moritzi Verz. Zoll. Pfl. 47, which I have not got. But I believe I got the name *Rungia laxiflora* from a Java plant marked *Justicia laxiflora*, which passed through my hands.

2. *RUNGIA MINUTIFLORA*, C. B. Clarke, n. sp. Suberect, a branched herb, 9 in. high. *Leaves*: blade 2 by ·75 in., ovate-lanceolate; tip obtuse, nearly glabrous, attenuated at base; petiole up to ·5 in. long. *Spikes* linear, 1 to 1·25 in. long, very lax, interrupted at base; flower-bract ·125 in. long, elliptic-obtuse, green, microscopically brown-hairy. *Corolla* ·2 in. long. *Stamens* 2; one anther-cell a little below the other distinctly tailed. *Capsule* ·15 to ·175 in. long; placentæ rising elastically from the valves; seeds brown, minutely tuberculated.

KEDAH: Lankawi Island, *Curtis* 3689.

Family XCI.—LABIATÆ.

[By D. PRIN.]

Herbs, less often shrubs, usually beset with oil-glands. *Stem* usually 4-angled. *Leaves* opposite or whorled; exstipellate. *Flowers* irregular, solitary, 2-nate or fascicled, axillary or in centrifugal spicate cymes which by union in pairs form false whorls. *Calyx* persistent, nearly regular, or variously 4- to 5-cleft, or 2-lipped. *Corolla* gamopetalous, hypogynous; limb 4- to 5-lobed, or 2-lipped and personate, the lobes imbricate in bud. *Stamens* attached to the corolla-tube, usually 4 didynamous, sometimes the upper pair imperfect; anther-cells divaricate or parallel, sometimes disjoined, sometimes confluent. *Disk* usually prominent, regular or irregular. *Ovary* free, composed of two 2-celled carpels, the cells of which are also free; style simple, inserted between the lobes of the ovary; the stigma usually 2-lobed, its arms often unequal; ovules in each cell solitary, erect, anatropous. *Fruit* of 4 dry or rarely fleshy 1-seeded nutlets, rarely one or more of these abortive, situated at the base of the calyx; scar of attachment usually basal, small, occasionally lateral or sublateral and larger. *Seeds* small, erect, without albumen, or albumen very scanty; radicle inferior.—**DISTRIB.** Species about 2800, mainly in North Temperate regions.

Stamens 4, declinate :—

Lowest corolla-lobe patent, flat or slightly concave, wide-based; calyx-limb 2-lipped; upper tooth much wider than the others; filaments free :—

Corolla-tube very short, not or slightly exserted; stigma 2-fid

1. OCIMUM.

Corolla-tube long, usually far exserted; stigma entire or subentire

2. ORTHOSIPHON.

Lowest corolla-lobe deflexed, saccate or cymbiform, narrow-based :—

Calyx-limb uniform; teeth 5, subequal; lowest corolla-lobe thick-edged, deeply saccate, not much longer than the others; filaments free

3. HYPTIS.

Calyx-limb 2-lipped; upper tooth often (not always) wider than the others; lowest corolla-lobe cymbiform, much longer than the others, its margin not thickened :—

Filaments free beyond point of insertion on corolla-tube

4. PLECTRANTHUS.

Filaments connate in a sheath round the style ..

5. COLEUS.

Stamens not declinate; filaments free :—

Stamens 4, erect or spreading, equal or subequal; calyx-limb uniform; teeth 5, subequal; corolla-lobes 4, flat, subequal :—

Anthers 1-celled; filaments bearded:—

Whorls glomerulate in stout, lax, usually interrupted spikes

6. *POGOSTEMON*.

Whorls aggregated in slender, dense, continuous spikes

7. *DYSOPHYLLA*.

Anthers 2-celled, cells parallel; filaments not bearded;

whorls sometimes terminal, usually axillary

8. *MENTHA*.

Stamens ascending under upper lip of corolla; usually 4 didynamous, the anterior pair the longer; sometimes 2, one pair being imperfect; corolla 2-lipped:—

Calyx-limb distinctly 2-lipped:—

Calyx-throat remaining open after flowering; tube without dorsal appendage, undivided in fruit and persistent:—

Stamens two pairs; upper calyx-lip 3-toothed

9. *CALAMINTHA*.

Stamens one pair, with remote anther-cells; upper calyx-lip 3-toothed or entire

10. *SALVIA*.

Calyx-throat occluded after flowering; tube with a dorsal plate or pouch, 2-partite; the upper segment deciduous in fruit

11. *SCUTELLARIA*.

Calyx-limb uniform, or, if oblique, not 2-lipped; the teeth subequal:—

Anthers dimorphic; cells of anterior longer pair dimidiate, 1-locular, of posterior shorter pair 2-locular; upper corolla-lip short, flattish, pubescent externally but not woolly; flowers medium, purplish; calyx-teeth 5, subequal

12. *ANISOMELES*.

Anthers uniform; upper corolla-lip arched or hooded over stamens:—

Calyx-teeth 6 to 10; limb often oblique; upper corolla-lip densely woolly externally:—

Lower corolla-lip shorter than upper; flowers large, yellow

13. *LEONOTIS*.

Lower corolla-lip longer than upper; flowers medium or small, white

14. *LEUCAS*.

Calyx-teeth 5, subequal; limb uniform; upper corolla-lip pubescent externally but not woolly:—

Nutlets with a small basal or subbasal scar:—

Nutlets dry; flowers medium:—

Calyx-teeth spinescent; flowers purplish; leaves deeply incised

15. *LEONURUS*.

Calyx-teeth herbaceous; flowers white or yellow; leaves not incised

16. *PARAPHLOMIS*.

Nutlets fleshy; flowers large, yellow or white

17. *GOMPHOSTEMMA*.

Nutlets with a large lateral scar; flowers very small, yellow

18. *CYMARIA*.

1. *OCIMUM*, Linn.

Strongly scented herbs or undershrubs. *Flowers* small, in 6- to 10-flowered whorls, spicate or racemose; pedicels recurved under the calyx; bracts small, caducous. *Calyx* ovoid or campanulate, in fruit

deflexed, 2-lipped; upper lip broad, flat, decurrent; lower usually with 4 slender teeth, the central pair exceeding the lateral. *Corolla-tube* short, not annulate within; limb 2-lipped; lower lip declinate, entire, flat or nearly so; upper rather shorter than lower, subequally 4-fid. *Stamens* 4, declinate, didynamous, exserted; filaments free or the lower pair connate below, naked or the upper toothed or hairy below; anther-cells confluent. *Disk* entire or 3- to 4-lobed. *Style* 2-fid; lobes subulate or flattened. *Nutlets* smooth or subrugose, mucilaginous when moistened. —DISTRIB. Species about 60, throughout the Tropics.

Pedicels equalling or exceeding the calyx; two lower calyx-teeth

longer than the upper lip 1. *O. sanctum*.

Pedicels much shorter than the calyx:—

Lower calyx-teeth longer than the upper lip 2. *O. Basilicum*.

Lower calyx-teeth shorter than the upper lip 3. *O. gratissimum*.

1. *OCIMUM SANCTUM*, Linn. Mant. 85 (1767). An erect, softly hairy, much-branched herb, 1 to 2 ft. high. *Stems* and branches usually purplish, often woody at the base. *Leaves* opposite, membranous, pubescent on both surfaces, especially on the nerves and principally beneath, elliptic-oblong, obtuse or acute; base cuneate or truncate, entire; the margin elsewhere entire or serrate; 1 to 2 in. long, .6 to 1.2 in. wide; petiole .5 to 1 in. long, slender, pubescent. *Flowers* in slender racemes or panicles, 6 to 8 in. long, of rather close whorls; bracts ovate-acuminate, .12 in. long, ciliate. *Calyx* .12 in. (in fruit .2 in.) long; pedicels longer than the calyx, slender, .25 in. long, pubescent; lower lip of calyx longer than upper, its 4 teeth lanceolate, similar below; the central pair with long, slender, awn-like, upcurved tips, which project beyond the upper lip; the lateral pair with short straight tips; upper lip wide-obovate or suborbicular, reflexed, shortly apiculate. *Corolla* .15 in. long, purplish-pink; upper lip pubescent on the back. *Filaments* exserted, slender; the upper ones with a small bearded basal appendage. *Nutlets* .05 in. long, wide-ellipsoid, smooth, yellow with black markings. Roxb. Fl. Ind. III. 14; Wall. Cat. 2716; Benth. in DC. Prodr. XII. 38; Miq. Fl. Ind. Bat. II. 939; Hook. f. Fl. Br. Ind. IV. 609; Prain Beng. Plants 843. *O. monachorum*, Linn. Mant. 85. *O. tenuiflorum*, Linn. Sp. Pl. I. 597; Benth. in DC. Prodr. XII. 39. *O. inodorum*, Burm. Thes. Zeylan. 175, t. 80, f. 2.

In most of the provinces; in waste places. —DISTRIB. South-east Asia from Arabia eastwards; Australia; Pacific Islands.

This, the Sacred Tulsi of India, is no doubt an introduced plant in our area; where it is indigenous is uncertain.

2. *OCIMUM BASILICUM*, Linn. Sp. Pl. 597 (1753). An erect branching herb, 2 to 3 ft. high. *Stems* and branches usually green, sometimes purplish, glabrous or more or less hispidly hairy. *Leaves* opposite, membranous, green or purplish, variously pubescent, in extreme forms quite glabrous, in others strongly hispidly hairy, ovate-acute; base cuneate, entire; margin elsewhere entire or toothed or occasionally (in cultivated forms) deeply lobed; 1 to 2 in. long, .6 to 1.2 in. wide, occasionally, in cultivated varieties, larger; petiole .5 to 1 in. long. *Flowers* in rather dense racemes of whorls, the terminal raceme ultimately 6 to 8 in. long, much exceeding the lateral, rarely (var. *thyrsoides*) with all the racemes subequal, forming a terminal thyrse; bracts ovate-acute, petiolate. *Calyx* .2 in. (in fruit .35 in.) long; pedicels very short; lower lip with central pair of teeth longer than the upper lip, which is orbicular, longer than the campanulate tube. *Corolla* .35 to .5 in. long, variously white or pink or purplish, nearly or quite glabrous to pubescent or (var. *ciliata*) hispidulous. *Filaments* shortly exerted; the upper ones with a tooth above the base. *Nutlets* .07 in. long, ellipsoid, pitted. Wall. Cat. 2713; Hook. f. Fl. Br. Ind. IV. 608.

PERAK: *Wray*! PENANG: *Wallich*! MALACCA. Perhaps only cultivated in our area.—DISTRIB. Throughout Tropics of Eastern Hemisphere and Polynesia.

The presence of this species in Malacca is recorded by Sir J. D. Hooker (Fl. Br. Ind. I. c.), but there are not now any Malacca specimens at Kew. In Penang it has only been collected by Wallich; his plant is a glabrous form never met with in India save in gardens. No complete specimens have been sent from Perak, but Wray records the species, under the name "Ruku," as an adulterant of Patchouli. "Ruku" is, however, the Malay name for *Hyptis graveolens*, which is one of the usual adulterants of Patchouli leaves, though the writer finds that samples of "Ruku" do contain, mixed with the leaves and calyces of *Hyptis graveolens*, calyces of *O. Basilicum*. The particular variety met with in these samples being var. *pilosum*, there is just a possibility that in Perak this may sometimes occur as an escape from cultivation.

3. *OCIMUM GRATISSIMUM*, Linn. Sp. Pl. 1197 (1753). A shrubby, much-branched perennial, 4 to 6 ft. high, woody at the base. *Stems* glabrous; young branches pubescent. *Leaves* opposite, chartaceous, pubescent, elliptic-lanceolate, acute; base cuneate, entire; margin elsewhere coarsely crenate-serrate; 2.5 to 5 in. long, 1.5 to 2.25 in. wide; petiole 1 to 2.5 in. long, slender, pubescent. *Flowers* in simple or branched, strict, slender racemes; whorls rather close; rachis softly pubescent; bracts sessile, acuminate from a wide ovate base, exceeding the calyx, decussate and squarrose in young racemes. *Calyx* .12 in. (in fruit .25 in.) long, pubescent, glandular; pedicels very short, softly

pubescent; lower lip with central pair of teeth minute and much shorter than the upper lip, which is rounded and recurved. *Corolla* .17 in. long, yellowish- or greenish-white, externally pubescent. *Filaments* distinctly exserted; upper pair with a bearded tooth at the base. *Nutlets* .06 in. long, subglobose, rugose, brown. Roxb. Fl. Ind. III. 17; Wall. Cat. 2720; Hook. f. Fl. Br. Ind. IV. 608.

PENANG: *Wallich*. Almost certainly only cultivated in our area.—
DISTRIB. Tropics generally, but doubtfully indigenous in America.

The only record of this species from our area is that of Wallich, who collected specimens in Penang in 1822. Seeing that no one has sent it since from any of the provinces, it may almost certainly be concluded that Wallich's specimens came from cultivated plants or from casual escapes that have not become permanently established.

2. ORTHOSIPHON, Benth.

Herbs, undershrubs, or shrubs. *Flowers* in 6- or fewer-flowered racemously arranged whorls; bracts small. *Calyx* 2-lipped, ovoid or campanulate-tubular, deflexed in fruit; lower lip 4-toothed, the central and lateral teeth distinct or shortly connate, usually subulate; upper lip broad, membranous; the margins decurrent. *Corolla* 2-lipped; tube often slender, straight or incurved; lower lip entire, concave; upper lip 3- to 4-fid. *Stamens* 4, declinate, didynamous, included or exserted; filaments free, not appendaged at base; anther-cells confluent. *Disk* usually gibbous. *Style* with a small capitate or clavate, entire or notched stigma. *Nutlets* dry, ovoid or globose, smooth or nearly so.—DISTRIB. Species about 60, in Tropics of the Old World.

ORTHOSIPHON STAMINEUS, Benth. in Wall. Pl. As. Rar. II. 15 (1831). A slender glabrous or pubescent herb, 1 to 2 ft. high; stems distinctly quadrangular. *Leaves* opposite, membranous, usually puberulous to pubescent on the nerves on both surfaces, otherwise glabrous, rather dark-green above, ovate-acuminate, with long entire cuneate base; margin elsewhere coarsely wide-serrate; 2 to 4 in. long, .75 to 1.5 in. wide; petiole .25 to .4 in. long, puberulous or pubescent. *Flowers* in rather distant whorls, .6 in. apart below, these arranged in lax terminal racemes 4 to 8 in. long, 1.5 in. across, not including the far-exserted filaments. *Calyx* .15 in. (in fruit .25 in.) long, campanulate, puberulous on the nerves, gland-dotted between; the two central teeth of lower lip subulate. *Corolla* uniformly finely puberulous, 1 in. long, purplish or white; tube slender, straight, thrice as long as calyx; lower lip straight, .2 in. long; upper lip refracted, .2 in. long. *Filaments* glabrous, capillary, projecting 1.2 in. beyond corolla-limb. *Nutlets* wide-oblong, compressed, rugulose. Benth. Lab. Gen. & Sp. 29, and in DC. Prodr. XII.

52; Wall. Cat. 2727; Bot. Mag. t. 5833; Miq. Fl. Ind. Bat. II. 944; Hook. f. Fl. Br. Ind. IV. 615. *Ocimum grandiflorum*, Blume Bijdr. 835. *O. longiflorum*, Ham. in Wall. Cat. l. c.

PERAK: *Kunstler*! SINGAPORE: *Deschamps*! NICOBARS: *Kurz*!—DISTRIB. South-eastern Asia and Australia.

3. HYPTIS, Jacq.

Herbs or shrubs. *Flowers* small or medium, very variously arranged; in our species arranged in dense capitate or lax secund heads; bracts subulate or setaceous. *Calyx* 10-nerved, ovate or campanulate or tubular; teeth 5; subequal, erect. *Corolla* 5-lobed; lowest lobe abruptly deflexed, with thickened margin, saccate and contracted at the base; the other lobes erect or spreading, flat. *Stamens* 4, declinate; filaments free, without basal appendages; anther-cells confluent. *Disk* entire, regular or somewhat gibbous in front. *Style* with subentire or 2-fid stigma. *Nutlets* oblong or ovoid, smooth or rugulose.—DISTRIB. Species about 250, all American; a few introduced and established in the Tropics of the Old World.

Flowers in dense, globose, axillary, many-flowered heads	.. 1. <i>H. brevipes</i> .
Flowers in lax, secund, racemose, few-flowered heads	.. 2. <i>H. suaveolens</i> .

1. *HYPTIS BREVIPES*, Poit. Ann. Mus. Par. VII. 465 (1806). An erect annual herb, 2 to 3 ft. high. *Stems* glabrate or pilose. *Leaves* opposite, membranous, medium-green and sparsely hispid throughout above, paler and pubescent on the nerves beneath, ovate-oblong or lanceolate; apex acute; base long-cuneate, entire; margin elsewhere serrate; 2 to 3 in. long, .75 to 1 in. wide; petiole .25 to .5 in. long. *Flowers* in dense heads, .4 in. in diam., on axillary, hispid, slender peduncles .4 to .5 in. long; bracts ciliate, lanceolate or subulate, rigid, .2 in. long. *Calyx* subtubular, .1 in. (in fruit .15 in.) long, ciliate; teeth erect, subequal, subulate, as long as the tube. *Corolla* .2 in. long; tube slender. *Nutlets* ovoid, brown, minutely rugulose. Benth. in DC. Prodr. XII. 107; Miq. Fl. Ind. Bat. II. 959; Hook. f. Fl. Br. Ind. IV. 630.

MALACCA: *Griffith* 3961! PENANG: *King*! SINGAPORE: *Kunstler*! PERAK: *Scortechini*! ANDAMANS: at Port Blair, *King*!—DISTRIB. America, from Brazil to Mexico; Tropical Africa and the Malay Archipelago, introduced.

Hyptis capitata, Jacq., a species in habit resembling *H. brevipes*, is frequently met with in gardens in S.E. Asia. It sometimes occurs spontaneously in waste places in India, and appears to have become established in the Philippines and in Formosa. The

possibility of its occurrence in our area should therefore be kept in mind. It is readily distinguished from *H. brevipes* by its much larger capitula, which reach .75 in. across, and by its calyx-teeth being shorter than the tube. There is nothing in the description of the mysterious *Leucas globulifera* (Hassk. Cat. Hort. Bogor. alt. 133), which finds a place in various works of reference and which is obviously not a *Leucas*, to prevent it from having been *Hyptis capitata* in cultivation, as Hasskarl says, at Buitenzorg. Hasskarl's small 2-fid upper lip may stand for the two upper corolla-lobes, the lateral lobes of the lower lip being the two lateral corolla-lobes; the concave mid-lobe, largest of the three in what Hasskarl terms the lower lip, explains itself. Every other character agrees with *Hyptis capitata*, and the combination of characters will fit no other Labiate known to the writer as likely to be in cultivation in Java when Hasskarl wrote.

2. *HYPTIS SUAVEOLENS*, Poit. Ann. Mus. Par. VII. 472, t. 29, f. 2 (1806). A rigid, branching, annual herb, 2 to 4 ft. high. *Stems* hirsute. *Leaves* opposite, firmly herbaceous, dark-green, pilose above, paler, densely grey-pubescent beneath, rather wide-ovate, subacute; base rounded, truncate or slightly cuneate, rarely subcordate; margin sinuate and serrulate; .75 to 3 in. long, .6 to 2 in. wide; petiole slender, .35 to .75 in. long, sparingly pubescent. *Flowers* in lax few-flowered, secund heads, .5 in. long, arranged racemously towards ends of branches in the axils of smaller leaves, on pubescent peduncles .5 in. long; bracts minute, setaceous. *Calyx* campanulate, .2 in. (in fruit .35 in.) long, strongly ribbed; mouth villous; teeth erect, subulate, shorter than tube. *Corolla* blue, .3 in. long; tube slender. *Nutlets* narrowly oblong, brown, faintly rugose. Benth. in DC. Prodr. XII. 126; Miq. Fl. Ind. Bat. II. 959; Hook. f. Fl. Br. Ind. IV. 630. *Ballota suaveolens*, Linn. Sp. Pl. 815. *Bysteropogon suaveolens*, L'Hérit. Sert. Angl. 19. *B. graveolens*, Blume Bijdr. 824. *Schaueria graveolens*, Hassk. in Flora, 1842, II. Beibl. 25.—Malay name "Ruku."

PERAK: *Wray*! MALACCA: *Maingay* 2280! PENANG: *Deschamps*! NICOBARS: *Kurz* 26063!—DISTRIB. Tropical America; introduced and widely spread in South-east Asia.

Leaves largely used, along with those of *Urena lobata*, Linn., in adulterating commercial samples of leaves of *Pogostemon Cablin*, the Patchouli plant principally cultivated in our area.

4. *PLECTRANTHUS*, L'Hérit.

Herbs or undershrubs. *Flowers* usually small, generally in lax, paniculate, 6- to 8-flowered cymes. *Calyx* 5-toothed, 2-lipped, enlarging in fruit. *Corolla-tube* exserted, long or short, decurved or straight; limb gibbous or sometimes spurred, less often straight, 2-lipped; lower

lip entire, long boat-shaped; upper short, 3- to 4-fid, recurved. *Stamens* 4, declinate; filaments free, simple; anther-cells usually confluent. *Disk* usually produced anteriorly, there nearly to fully as long as the ovary. *Style* usually 2-fid. *Nutlets* orbicular or occasionally oblong or ovoid, smooth, granulate or punctate.—**DISTRIB.** Species about 100, in the Tropics of the Old World, Australia and Polynesia.

PLECTRANTHUS KUNSTLERI, Prain Journ. As. Soc. Beng. LXVI. ii. 521 (1897). A stoutish shrubby plant, 2 to 5 ft. high, everywhere finely puberulous. *Leaves* opposite, membranous, pale-green especially beneath and there sparsely glandular-puberulous, darker and similarly faintly puberulous above, sometimes with a whitish line down the centre, ovate-acute with entire, cuneate base and short, entire, subacuminate apex; margin elsewhere regularly crenate; 3 to 4.75 in. long, 1.5 to 2 in. wide; petiole 1.5 to 2 in. long. *Flowers* in racemed cymes disposed in stout panicles with ascending branches, 6 in. long, 4 in. across. *Calyx* in fruit .2 in. long, gland-dotted; pedicels .15 in. long, finely puberulous; the two lower teeth subulate, the two lateral ovate-acute, longer than the upper orbicular-ovate. *Corolla* greenish-white, or waxy white, faintly dotted, .4 in. long; the tube decurved with a gibbous base, one and a half times as long as the boat-shaped lower lip; upper lip rather short. *Filaments* discrete from the point at which they are free from the corolla-tube. *Nutlets* oblong, brown, hardly shining. Ann. Roy. Bot. Gard. Calc. IX. i. 55, t. 70.

PERAK: Kwala Dipong, 400 to 600 ft. elev., *King's Collector (Kunstler)* 8240! Kinta, 800 to 1000 ft., *King's Collector (Kunstler)* 7143! On limestone ridges.

5. *COLEUS*, Lour.

Herbs. *Flowers* usually small, generally in lax, paniculate, 6- to 8-flowered cymes. *Calyx* 5-toothed, 2-lipped, enlarging in fruit. *Corolla-tube* exserted, long or short, decurved or straight; limb gibbous or less often straight, 2-lipped; lower lip entire, long boat-shaped; upper short, 3- to 4-fid, recurved. *Stamens* 4, declinate; filaments combined below into a sheath around the style; anther-cells usually confluent. *Disk* usually produced anteriorly. *Style* usually 2-fid. *Nutlets* orbicular, oblong or ovoid, smooth, granulate or punctate.—**DISTRIB.** Species about 80, in the Tropics of the Old World and in Australia.

COLEUS ATROPURPUREUS, Benth. in Wall. Pl. As. Rar. II. 16 (1831). A herb 2 to 3 ft. high, everywhere finely pubescent. *Leaves* opposite, membranous, dark-green above, rather closely puberulous on the nerves, elsewhere sparingly so, paler beneath and pubescent on the main and

secondary nerves, ovate-acute, with entire rounded rarely cuneate base, and short, entire, blunt apex; margins elsewhere rather widely crenate; 2 to 4 in. long, 1.25 to 1.75 in. wide; petiole 1 to 2 in. long. *Flowers* in irregularly branched cymes disposed in stoutish thyrses 3 to 6 in. long, 1.5 in. across; bracts ovate-acute, pubescent, .15 in. long, deciduous. *Calyx* in fruit .2 in. long, sparingly gland-dotted; pedicels .2 in. long, pubescent; the two lower teeth subulate, the two lateral oblong-obtuse, shorter than the upper ovate-subacute. *Corolla* blue and white, .35 in. long; the tube abruptly decurved, shorter than the lower lip; upper lip very short. *Filaments* connate far beyond point of attachment to corolla-tube. *Nutlets* orbicular, brown, almost shining. Benth. Lab. Gen. & Spec. 54 and in DC. Prodr. XII. 74; Wall. Cat. 2733; Nunes Fl. Filip. t. 208; Miq. Fl. Ind. Bat. II. 951; Hook. f. Fl. Br. Ind. IV. 626.

In most of the Provinces.—DISTRIB. Malay Archipelago; Philippines; Polynesia.

6. POGOSTEMON, Desf.

Herbs or undershrubs, often strongly scented. *Leaves* usually opposite. *Flowers* small, in simple or paniculate spikes or contracted racemes formed of many dense-flowered subcapitate whorls. *Calyx* almost equally 5-toothed. *Corolla* 2-lipped; upper lip 3-lobed, the lobes subequal or the central one rather longer and narrower than the lateral ones; the lower lip flat, patent, entire. *Stamens* 4, exserted, straight or declinate, the lower pair rather shorter than the upper; filaments bearded; anther-cells confluent. *Disk* subentire, uniform. *Style* shortly 2-fid, the arms subulate, subequal. *Nutlets* smooth, ovoid or ellipsoid.—DISTRIB. Species about 30, throughout South-eastern Asia.

Leaves membranous, sparingly puberulous or almost glabrous; whorls separated by distinct interspaces throughout the spikes; corolla glabrous externally, except for a few hairs on margin of lower lip 1. *P. Heyneanus*.

Leaves herbaceous, densely pubescent, especially beneath; whorls contiguous throughout the spikes or only the lowest separated by an interspace; corolla uniformly pubescent externally 2. *P. Cablin*.

1. POGOSTEMON HEYNEANUS, Benth. in Wall. Pl. As. Rar. I. 31 (1830). An erect branching herb, 2 to 4 ft. high. *Stems* and branches slender, sparsely pubescent. *Leaves* opposite, thinly membranous, very sparingly puberulous or sometimes almost glabrous on both surfaces,

medium-green above, pale-green beneath, ovate-acute; base wide-cuneate, entire; margin elsewhere crenate, each lobule again crenulate; 2.5 to 4 in. long, 1.5 to 2.75 in. wide; petiole 1 to 1.5 in. long, very sparingly puberulous. *Flowers* in slender, simple or paniculately branching terminal spikes 3 to 6 in. long; whorls at the base .5 to .75 in. apart, gradually more approximate upwards, but those near the apex still .2 to .15 in. apart; whorls .4 in. across; bracts elliptic, acute, sparingly puberulous, .15 in. long or less. *Calyx* .15 in. (in fruit .2 in.) long, sparingly pubescent externally; teeth triangular, one-third the length of the tube, equal and similar. *Corolla* .2 in. long, glabrous externally save for a few hairs on margin of lower lip. *Filaments* exerted, almost straight, all bearded. *Style-arms* short, only one-tenth to one-eighth the length of the style. *Nutlets* wide-ovate, .02 in. long, dark-brown with a paler base, smooth. Benth. Lab. Gen. & Sp. 154, and in DC. Prodr. XII. 153; Wight Ic. t. 1440; Cooke Fl. Bomb. II. 455. *P. Patchowli*, Dalz. & Gibs. Bomb. Fl. Addend. 66 (not *P. Patchouly*, Pellet.). *P. Patchouli*, Hook. f. Fl. Br. Ind. IV. 633 (not *P. Patchouly*, Pellet.).

SINGAPORE: *G. Thomson*. MALACCA: *Griffith*, 3966! SELANGOR: Rawang, *Ridley* 7603! Cultivated or as an escape from cultivation.—
DISTRIB. India and Ceylon; where, however, it is only known as a cultivated plant or as an escape from cultivation.

This, the Indian "Patchouli," if one may judge from the specimens communicated, is the plant first introduced to our area on account of its peculiar scent. There is nothing to indicate whether it was formerly at all extensively cultivated; it does not appear to be so now.

2. *POGOSTEMON CABLIN*, Benth. in DC. Prodr. XII. 156 (1848). An erect, rather stout, branching undershrub, 2 to 5 ft. high. *Stems* and branches stout, distinctly swollen under the nodes, densely hoary-pubescent. *Leaves* opposite, herbaceous, closely densely pubescent on both surfaces, especially beneath, dark-green above, medium-green below, ovate-acute; base shortly cuneate or subtruncate, entire; margin elsewhere usually deeply lobate, the lobes crenate; rarely margin simply crenate or in upper leaves almost entire; 3 to 4 in. long, 2 to 3 in. wide; petiole 1.5 to 2.5 in. long, densely hoary-pubescent. *Flowers* in stout simple spikes terminating the stem and the branches, 1.5 to 4 in. long, the lowest whorl sometimes .5 to .6 in. remote from the next, the rest or all the whorls closely aggregate; whorls .75 in. across or more; bracts elliptic, acute, densely pubescent, .2 to .35 in. long. *Calyx* .2 in. (in fruit .25 in.) long, densely pubescent, especially along the nerves; teeth triangular, one-third the length of the tube,

equal and similar. *Corolla* .3 in. long, the throat and lips uniformly pubescent externally. *Filaments* exserted, almost straight, all bearded. *Style-arms* rather long, one-fifth to one-fourth the length of the style. *Nutlets* not seen ripe. *P. Patchouli*, Pellet. in Mem. Soc. Sc. Orleans V. 277, t. 7. *P. suavis*, Ten. in Giorn. Bot. Ital. II. 56. *P. Patchouli*, Hook. Kew Journ. Bot. I. 328, t. 11. *P. Patchouli* var. *suavis*, Hook. f. Fl. Br. Ind. IV. 634. *Mentha Cablin*, Blanco, Fl. Filip. 473. *M. auricularia*, Blanco Fl. Filip. ed. 2, 329 (not of Linn.).

PERAK: *Wray*! PENANG: *Wallich*! *Curtis*! Cultivated only, in our area.—DISTRIB. Philippines; where, according to Loher, it occurs only in gardens.

This plant seems to flower not infrequently in the Philippines; there are specimens from thence at Kew collected both by Vidal and by Loher. So far as is known, it has flowered only three times in Europe: once in France, recorded by Pelletier (1844); once in Italy, recorded by Tenore (1847); once in England, recorded by Sir W. J. Hooker (1849): Hooker's plant was obtained from Tenore. No flowering specimen has ever been communicated from our area where, according to Wray and Curtis, it is extensively cultivated by Chinese settlers. In the Royal Botanic Garden at Calcutta the plant has been in continuous cultivation since 1834, when Wallich first obtained it from Penang; at Saharanpur, whence it was distributed from the Calcutta Garden, it has also been long in cultivation. At Calcutta and at Saharanpur all attempts to induce the plant to flower have consistently failed.

This, which may be termed the Malayan, as opposed to the original or Indian Patchouli, is not known to be cultivated anywhere in India except in botanical gardens.

There are indications that a third kind of Patchouli plant, the Chinese Patchouli (*Microtoena cymosa*, Prain), had at one time been introduced, not impossibly by Chinese settlers, to Java. But its cultivation has not persisted in the Malayan Archipelago, and there is no indication that it was ever introduced to the Peninsula. The Chinese Patchouli seems at one time to have been cultivated to a considerable extent in North-eastern India, and to have competed in the Calcutta market with the Indian Patchouli (*Pogostemon Heyneanus*). Now, however, the Malayan Patchouli, the product of *Pogostemon Cablin*, appears to have so completely supplanted both the others that neither are offered for sale, and the cultivation of *Pogostemon Heyneanus* is restricted to native gardens in the Indian Peninsula, while that of *Microtoena cymosa* only lingers in a few native gardens in the Khasia Hills.

In commercial samples of the leaves of *Pogostemon Cablin*, various extraneous leaves are to be met with. The chief of these are leaves of *Hyptis suaveolens*, Poit., in our area known as "Ruku," also leaves of *Urena lobata*, Linn., known in our area as "Perpulut." With *Hyptis suaveolens*, and under the same name "Ruku," are associated the leaves of *Ocimum Basilicum*, Linn., var. *pilosum*. These, however, are in much smaller quantity than those of the *Hyptis*.

7. DYSOPHYLLA, Bl.

Herbs. *Leaves* opposite or whorled. *Flowers* minute, in dense long spikes composed of numerous close-set many-flowered cymes. *Calyx* minute, ovoid, 5-toothed; teeth subequal; throat naked within. *Corolla* minute; tube exserted or included, limb equally 4-fid; upper lobe entire or notched, lower spreading. *Stamens* 4, exserted, straight or nearly so; filaments bearded, very long; anther-cells confluent. *Disk* equal, subentire. *Style* 2-fid. *Nutlets* ovoid or oblong, smooth or granulate.—DISTRIB. Species about 15, in Tropics of Old World and Australia.

DYSOPHYLLA AURICULARIA, Blume Bijdr. 826 (1826). A coarse annual herb. *Stems* laxly branched, rarely simple, 1 to 2 ft. high, pubescent with spreading hairs. *Leaves* opposite, membranous, rather pale-green, especially beneath, with numerous scattered hairs above and with similar hairs on the nerves beneath, ovate or oblong-ovate, acute or rarely obtuse, with entire cuneate or rounded base; margins elsewhere coarsely serrate; 1 to 2.75 in. long, .5 to 1 in. wide; petiole .1 to .4 in. long. *Flowers* in villous cylindric terminal spikes 1.5 to 3 in. long, .2 to .35 in. in diam.; whorls of cymes close-set throughout. *Calyx* in fruit .1 in. long, subcampanulate, gland-dotted; teeth subequal, triangular, incurved over the nutlets. *Corolla* .1 in. long, pinkish; tube slender, much exserted; lobes short, pubescent. *Filaments* exserted, densely villous. *Nutlets* ellipsoid, almost smooth. Benth. Lab. Gen. & Sp. 158, in DC. Prodr. XII. 156, and in Wall. Pl. As. Rar. I. 30; Wall. Cat. 1548; Wight Ic. t. 1445; Hook. f. Fl. Br. Ind. IV. 638. *Mentha auricularia*, Linn. Mant. 81; Roxb. Fl. Ind. III. 4; Griff. Notul. IV. 200. *M. fatida*, Burm. Fl. Ind. 126.

In all the provinces.—DISTRIB. Throughout South-east Asia.

8. MENTHA, Linn.

Strongly scented perennial herbs with creeping rootstocks. *Flowers* small, in usually many-flowered terminal spikes or axillary whorls; bracts small or large. *Calyx* tubular or campanulate, 10-ribbed, 5-toothed; teeth subequal. *Corolla-tube* infundibuliform, short; lobes 4, the uppermost rather wider than the other three, emarginate. *Stamens* 4, usually dimorphic, subequal; filaments free, erect, distant; anthers 2-celled; cells parallel. *Disk* entire, uniform. *Style-arms* short, subequal. *Nutlets* ovoid, smooth or reticulate.—DISTRIB. Species variously estimated—perhaps not more than 30 in reality—mainly in North Temperate regions, but some now widely dispersed in all parts of the world.

MENTHA JAVANICA, Blume Bijdr. 826 (1826). A prostrate herb, rooting

below. *Stems* 1 to 2 ft. long, pubescent with reflexed adpressed hairs. *Leaves* opposite, membranous, harshly hairy above, glabrous beneath, rather wide-lanceolate, acute; base long-cuneate, entire; margin elsewhere serrate; 1 to 2 in. long, .25 to .35 in. wide; petiole .25 in. long or shorter; floral leaves like those on the stem below the whorls. *Flowers* in axillary capitate distant whorls; bracts acute, shorter than the flowers. *Calyx* .1 in. long, tubular-campanulate, adpressed-pubescent; teeth lanceolate, acute, longer than the tube. *Corolla* .15 in. long, pubescent. Benth. in DC. Prodr. XII. 173. *M. sativa*, Roxb. Fl. Ind. III. 6 (*hardly* of Linn.). *M. arvensis*, Thw. Enum. Pl. Zeyl. 239; Trim. Fl. Ceyl. III. 381 (*hardly* of Linn.). *M. arvensis* var. *javanica*, Hook. f. Fl. Br. Ind. IV. 648.

MALACCA: Griffith!—DISTRIB. Ceylon; Java; Philippines.

Apparently rare, and possibly an introduced plant in our area, seeing that it has never been reported since Griffith met with it. As Sir J. D. Hooker remarks, this, which is Roxburgh's *M. sativa*, may really be a form of *M. sativa*, Linn., and, if so, may only be a state of *M. arvensis*, Linn., to which Boissier refers *M. sativa*, and to which Thwaites refers the present plant. For the purposes of a local flora, however, it seems better to keep this form, which is easily recognized, apart as a distinct species.

9. CALAMINTHA, Moench.

Herbs or shrubs. *Flowers* small or medium, in dense axillary or loose spicate or racemose or paniced whorls. *Calyx* 13-nerved, 2-lipped; lower lip 2-toothed, teeth narrow; upper lip 3-toothed, teeth wider and more highly connate; throat naked or villous. *Corolla-tube* straight, throat villous; lower lip spreading, 3-lobed; upper lip erect, flattish. *Stamens* 4, didynamous, ascending under upper lip, the upper pair sometimes imperfect; anther-cells parallel or divaricate. *Disk* uniform, entire. *Style-lobes* equal or the upper smaller. *Nutlets* minute, subglobose, smooth.—DISTRIB. Species about 40, in North Temperate regions.

CALAMINTHA GRACILIS, Benth. in DC. Prodr. XII. 232 (1848). A slender prostrate herb. *Stems* 8 to 12 in., faintly puberulous, rooting below. *Leaves* opposite, membranous, glabrous on both sides, dark-green above, paler beneath, ovate-subacute; base rounded or shortly cuneate, entire; margin elsewhere serrate; .4 to .6 in. long, .3 to .5 in. wide; petiole .25 in. long, puberulous. *Flowers* in lax many-flowered whorls in axils of uppermost leaves, and there remote or aggregated in racemose or subcapitate terminal racemes, with rachis sparsely pubescent; bracteoles subulate, finely puberulous, half as long as slender pedicels. *Calyx* .12 in. (in fruit .17 in.) long; tube slightly inflated below; lower teeth subulate, ciliate, incurved; upper lip shortly 3-toothed, recurved; teeth

ovate; pedicels .12 in. long, puberulous. *Corolla* .2 in. long. *Nutlets* .02 in., pale-brown, smooth.

PERAK: Thaiping, *Ridley* 11912!—DISTRIB. Java; Assam.

This species is not included in the 'Flora of British India.' It was obtained by the late Mr. C. B. Clarke, at Dibrugarh in Upper Assam, subsequent to the appearance of the account of the Indian species of this family by Sir Joseph Hooker.

10. SALVIA, Linn.

Herbs, undershrubs or shrubs. *Flowers* small, medium, or large and showy; whorls usually in racemes or spikes; bracts small or large, sometimes coloured. *Calyx* campanulate or tubular, 2-lipped; mouth naked; upper lip entire or 3-toothed; lower lip 2-fid. *Corolla* 2-lipped; tube naked or annulate within; lower lip 3-lobed, the central lobe usually wider than the lateral, entire or emarginate; upper lip erect. *Stamens* 2, the upper pair imperfect, represented by small staminodes or obsolete; filaments short, articulating with a slender connective, and sometimes produced beyond the joint; connective linear, transverse, with an upper ascending arm which bears a linear fertile anther-cell, and a lower straight or deflexed arm bearing a cell which may be empty or fertile or bearing no cell. *Disk* usually enlarged anteriorly. *Style* shortly 2-fid; the lobes usually subulate, equal or the lower larger, sometimes flattened. *Nutlets* ovoid, somewhat triquetrous, smooth.—DISTRIB. Species about 450, cosmopolitan.

Flowers rather large, showy; corolla-tube long, far exserted	.. 1. <i>S. coccinea</i> .
Flowers minute, inconspicuous; corolla-tube short, not exserted	.. 2. <i>S. plebeia</i> .

1. SALVIA COCCINEA, Juss. ex Murr. in Comm. Gott. I. 86, t. 1 (1778). A slender herb, 1 to 3 ft. high. *Stems* numerous, 4-angled, ascending, often branched, finely pubescent. *Leaves* opposite, membranous, glabrous above, finely white-pubescent beneath, dark-green, ovate- or cordate-acute, crenate except the base; 1 to 1.5 in. long, .75 to 1 in. wide; petiole slender, finely puberulous, .6 to .8 in. long. *Flowers* in 6- to 10-flowered remote whorls disposed in terminal racemes; bracts ovate-acuminate, deciduous; pedicels .12 in. long, slender, puberulous. *Calyx* .25 in. (in fruit .35 in.) long, pubescent, striate, narrowly campanulate; upper lip entire, obtuse; lower 2-fid; the lobes acute. *Corolla* .75 in. long, red; tube straight, much exserted, widened upwards; lower lip spreading, 3-fid; upper lip short, erect. *Nutlets* .08 in. long, very narrowly oblong, smooth, brown, shining. Linn. f. Suppl. 88; Benth. in DC. Prodr. XII. 343; Hook. f. Fl. Br. Ind. IV. 656. *S. Gerardiana*, Benth. in Wall. Cat. 2150.

SINGAPORE: *Kurz!* MALACCA: *Maingay* 1167! 1778! ANDAMANS: Port Blair, *Kurz!*—DISTRIB. America, where indigenous; Africa and South-east Asia, where generally cultivated and often as an escape from gardens.

2. *SALVIA PLEBEIA*, R. Br. Prodr. 501 (1810). An erect herb, 6 to 18 in. high. *Stems* obtusely 4-angled, grooved, hoary-pubescent. *Leaves* opposite, membranous, sparsely hirsute or nearly glabrous, oblong-oblancheolate, obtuse or subacute; base usually cuneate, entire; margin elsewhere irregularly crenate; 2 to 4 in. long, .75 to 1.75 in. wide; petiole 1 to 2 in. long. *Flowers* in paniculate or subthyrsoid, interrupted, pubescent, spicate racemes; bracts small, linear-spathulate; pedicels short. *Calyx* .1 to .12 in. (in fruit .18 to .2 in.) long, campanulate, 2-lipped; upper lip obtuse, entire, lower 2-fid; the lobes acute or subacute. *Corolla* small, .15 in. long, whitish; lower lip 3-lobed, the mid-lobe exceeding the lateral ones; upper lip oblong, obtuse. *Nutlets* .04 in. long, ovoid, smooth, brown. Benth. Lab. Gen. & Sp. 309, and in DC. Prodr. XII. 355; Miq. Fl. Ind. Bat. II. 970; Hook. f. Fl. Br. Ind. IV. 655. *S. brachiata*, Roxb. Fl. Ind. I. 145; Wall. Cat. 2149.

MALACCA: perhaps also in some of the other provinces.—DISTRIB. South-east Asia generally; Australia. A very common Indian field-weed, but in our area apparently extremely rare and perhaps only introduced.

11. SCUTELLARIA, Linn.

Herbs or undershrubs. *Flowers* often in long narrow racemes. *Calyx* campanulate, 2-lipped; lips closed in fruit, ultimately free to the base, the upper at length deciduous, with a deciduous dorsal scale or pouch, the lower persistent. *Corolla* 2-lipped; tube long, usually abruptly recurved beyond the calyx and ascending, dilated at the throat, not annulate within; lower lip wide, 3-lobed, the lateral lobes small and often connate with upper lip, which is erect, galeate, entire or notched. *Stamens* 4, didynamous, the upper pair shorter, ascending under the hooded upper lip; anthers connivent, ciliate, those of upper stamens 2-celled, of lower 1-celled. *Disk* elongate. *Style* 2-fid; upper lobe very short. *Nutlets* subglobose, smooth, granulate or hispidulous.—DISTRIB. Species about 90, mainly in the Northern Hemisphere.

Pubescent; leaves purple beneath; corolla pale-blue	..	1. <i>S. discolor</i> .
Glabrous; leaves green beneath; corolla dark-blue, with white		
centre of lower lip	.. ..	2. <i>S. andamanica</i> .

1. *SCUTELLARIA DISCOLOR*, Colebr. in Wall. Pl. As. Rar. I. 66 (1830). A slender pubescent herb. *Stems* ascending from a creeping rootstock, 1 to 2 ft. high; rarely branched, often naked above. *Leaves* opposite, and crowded towards the base of the stem, pubescent on both sides, often purple beneath, elliptic, obtuse; base rounded or cordate; margin crenate; 1·5 to 4 in. long, .75 to 2·5 in. wide; petioles 1 to 3 in. long. *Flowers* disposed in slender racemes 2 to 8 in. long; rachis pubescent; bracts .1 to .15 in. long; pedicels .1 in. long. *Calyx* .12 in. (in fruit .2 in.) long, pubescent. *Corolla* pale-blue, faintly puberulous externally, .5 to .6 in. long; tube .4 in. long; throat somewhat dilated; lower lip 3-lobed; upper lip galeate, obtuse. *Nutlets* .03 in. long, scabrid. Benth. in DC. Prodr. XII. 417; Hook. f. Fl. Br. Ind. IV. 667. *S. indica*, Blume Bijdr. 839; Wall. Cat. 2134 (not of Linn.). *S. heteropoda*, Miq. Fl. Ind. Bat. II. 972.

PERAK: *Scortechini*. — *DISTRIB.* India; Indo-China; Malay Archipelago.

2. *SCUTELLARIA ANDAMANICA*, Prain Journ. As. Soc. Beng. LIX. ii. 307 (1890). A slender glabrous undershrub. *Stems* many from a woody rootstock with clustered rootlets, 8 to 10 in. high, simple or branched. *Leaves* opposite, rather few, oblong-lanceolate, obtuse; base long-cuneate, entire; margin elsewhere crenate-dentate; 1·5 to 1·75 in. long, .4 to .6 in. wide; petiole 1 to 1·5 in. long. *Flowers* opposite above, in whorls of three below, in slender racemes 3 to 4 in. long; bracts .12 in. long; pedicels .12 in. long. *Calyx* .12 in. (in fruit .2 in.) long, glabrous. *Corolla* blue, with centre of lower lip white; .6 in. long; throat little dilated; lower lip 3-lobed; upper lip galeate. *Nutlets* .04 in. long, scabrid, pale-brown. Ann. Roy. Bot. Gard. Calc. IX. i. 56, t. 71 A.

ANDAMANS: Port Blair, in stream beds, not uncommon.

12. ANISOMELES, R. Br.

Herbs, with tall coarse branching *stems*. *Flowers* medium, in axillary whorls, or in lax branching paniculate cymes. *Calyx* ovoid or tubular, straight, equally 5-toothed. *Corolla-tube* short, annulate within; lower lip 3-lobed, broad and patent, the mid-lobe retuse or notched; upper lip entire, erect. *Stamens* exerted; anthers connivent, those of the lower and longer pair dimidiate; of the shorter upper pair 2-celled; the cells parallel, transverse. *Disk* equal. *Style* subequally 2-fid. *Nutlets* smooth.—*DISTRIB.* Species about 8, South-eastern Asiatic and Australian.

Stems and branches acutely 4-angled, softly pubescent to glabrate; corolla pale-purple; calyx-teeth about as long as the tube 1. *A. ovata*.

Stems and branches obtusely 4-angled, densely white woolly; corolla dark-purple; calyx-teeth much shorter than the tube .. 2. *A. malabarica*.

1. *ANISOMELES OVATA*, R. Br. in Ait. Hort. Kew. ed. 2, III. 364 (1811). A stoutish shrubby plant, with acutely 4-angled *stems* and branches, 2 to 5 ft. high, sparingly hairy to densely pubescent or almost woolly. *Leaves* opposite, thickly herbaceous, uniformly hairy to woolly-tomentose on both sides, rather pale-green; ovate-acute with entire truncate, rounded, or subcordate, less often shortly cuneate base; margin elsewhere crenate-serrate; 1·5 to 4 in. long, 1 to 2·25 in. wide, rarely rather larger low down on the stem; petiole ·6 to 1·5 in. long. *Flowers* in dense whorls, distant below, approximate above in a dense spicate inflorescence; in fruit the cymes sometimes subsecundly explanate; bracts ·15 to ·2 in. long, linear, beset with long firm hairs. *Calyx* ·25 in. (in fruit ·35 in.) long, subsessile, hirsute with firm hairs; teeth lanceolate, acute, almost as long as tube, hairy within and without, ciliate. *Corolla* ·6 in. long, light-purple with blue lower lip; tube ·2 in. long; lower lip 4-lobed from deep division of the middle segment into two oblong lobes; the lateral lobes small, rounded; upper ·25 in. long, oblong, entire. *Filaments* hirsute. *Nutlets* ·1 in. long, wide-ovate, subcompressed; inner face bluntly angular, outer rounded, smooth, shining, nearly black. Wall. Cat. 2040; Jacq. Eclog. I. t. 86; Hook. Bot. Misc. II. 358, Suppl. t. 19; Benth. in Wall. Pl. As. Rar. I. 59, and in DC. Prodr. XII. 455; Wight Ic. t. 865; Miq. Fl. Ind. Bat. II. 975; Hook. f. Fl. Br. Ind. IV. 672. *A. disticha*, Heyne in Roth Nov. Sp. 254; Roxb. Fl. Ind. III. 2. *A. glabrata*, Benth. in Wall. Cat. 2041. *A. mollissima*, Wall. Cat. 2039. *A. indica*, O. Kuntze Rev. Gen. 512. *Nepeta indica*, Linn. Sp. Pl. 571. *N. amboinica*, Linn. f. Suppl. 273. *N. disticha*, Blume Bijdr. 823. *Ballota disticha*, Linn. Mant. 83. *B. mauritiana*, Pers. Syn. II. 126. *Ajuga disticha*, Roxb. Fl. Ind. III. 2. *Marrubium indicum*, Burm. Fl. Ind. 127. *M. odoratissimum*, Burm. Thes. Zeylan. t. 71, f. 1. *Monarda zeylanica*, Burm. Fl. Ind. 12.

In all the provinces, in waste places.—DISTRIB. South-eastern Asia generally; China.

A very variable plant as regards tomentum; the extreme forms being *A. glabrata*, Benth., which is only sparsely hairy, and *A. mollissima*, Wall., which is densely softly woolly-pubescent. The two forms mentioned are probably deserving of separation as varieties; intermediate states, however, occur.

2. *ANISOMELES MALABARICA*, R. Br. in Bot. Mag. t. 2071 (1819). An erect shrubby plant, with obtusely 4-angled stems and branches, 4 to 6 ft. high, densely tomentose or thickly woolly. *Leaves* opposite, very thickly herbaceous, pale-green above, white below, uniformly softly woolly tomentose, oblong-lanceolate, acute, with entire rounded or shortly cuneate base; margin elsewhere crenate-serrate; 2.5 to 4 in. long, .75 to 1.75 in. wide; petiole .5 in. long, stout, softly woolly. *Flowers* in dense whorls, distant below, approximate above, often 1.25 in. across, forming an interrupted spicate inflorescence; bracts .4 to .5 in. long, linear, acute, densely softly woolly. *Calyx* .3 in. (in fruit .4 in.) long, subsessile, densely villous; teeth about half as long as tube, narrowly lanceolate, acute, villous externally and internally, ciliate. *Corolla* .8 in. long, dark-purple, somewhat pubescent externally; tube .35 in. long; lower lip 4-lobed from deep division of the middle segment into 2 oblong obtuse lobes; upper lip .35 in. long, obtuse. *Filaments* pubescent. *Nutlets* .12 to .15 in. long, ellipsoid, compressed, inner face faintly angled, outer rounded, smooth, shining, brown. Wall. Cat. 2037; Hook. Journ. Bot. I. 225, t. 127; Wight Ic. t. 864; Benth. in Wall. Pl. As. Rar. I. 59, in Lab. Gen. & Sp. 704, and in DC. Prodr. XII. 456; Hook. f. Fl. Br. Ind. IV. 673. *A. intermedia*, Wight in Benth. Lab. Gen. & Sp. 703; DC. Prodr. XII. 456. *Nepeta malabarica*, Linn. Mant. 566. *Ajuga fruticosa*, Roxb. Fl. Ind. III. 1.

PENANG: Wallich 2037! Ayer Etam, Tat's Corner, Curtis 3741!—
DISTRIB. Drier parts of India and Ceylon; Mauritius, where it is probably an introduced species.

The fact that this plant is in our area confined, so far as is known, to Penang, makes it not improbable that we have here to deal with an introduced species. It is a common and characteristic plant of the Deccan and of the drier region of Ceylon, but does not occur elsewhere in India.

13. *LEONOTIS*, R. Br.

Herbs or shrubs, usually tall and coarse. *Flowers* large, in many-flowered axillary whorls; bracts numerous, slender. *Calyx* 10-nerved; tube often incurved; mouth oblique, with 8 to 10 rigid teeth, the uppermost longer than the rest. *Corolla-tube* included or exerted; lower lip small, 3-lobed, the mid-lobe largest; upper lip long, concave, villous above. *Stamens* 4, didynamous, ascending under upper lip, lower pair longer; anthers connivent; the cells divaricate. *Disk* equal. *Style* subulate, with very short upper lobe. *Nutlets* obovoid or oblong or ovoid, truncate or rounded at the apex, glabrous.—DISTRIB. Species about 12, mostly confined to Africa, the present one occurring also in Asia and America, where probably it was originally introduced.

LEONOTIS NEPETIFOLIA, R. Br. in Ait. Hort. Kew. ed. 2, III. 409 (1811). A tall erect annual herb, 4 to 7 ft. high, with stout obtusely thickly 4-angled stems deeply furrowed between the angles, finely pubescent. Leaves opposite, membranous, ovate-acute; base shortly cuneate and decurrent on the petiole, entire; margin elsewhere coarsely crenate-serrate, finely pubescent above and below, 2.5 to 6 in. long, 1.5 to 4 in. wide; petiole 1 to 4 in. long, winged near apex. Flowers in dense globose, axillary, many-flowered whorls 1.5 to 2.5 in. across; floral leaves lanceolate, deflexed; bracts linear, strongly spinescent at the apex, deflexed, pubescent, the longest .5 in. long or longer. Calyx .6 in. (in fruit .75 in.) long, tubular, incurved, strongly ribbed, puberulous below, densely pubescent above, where also hispid with long white hairs, reticulately veined within, glabrous; teeth 8 to 9, unequal, the uppermost .35 in. long, ovate-acute, much exceeding the triangular others, all with spinescent tips. Corolla 1 in. long, orange-scarlet; tube .5 in. long, glabrous near base, densely beset above with orange-scarlet pubescence, 3-annulate within with transverse bands of white hairs; lower lip .15 to .2 in. long, with 3 oblong obtuse lobes, the mesial rather the largest; upper lip .5 in. long, densely villous with orange-scarlet hairs. Nutlets .15 in. long, oblong-obovoid, obliquely truncate and pitted at apex. Benth. in Wall. Pl. As. Rar. I. 59, in Lab. Gen. & Sp. 618, and in DC. Prodr. XII. 535; Wall. Cat. 2042; Wight Ill. II. t. 176 B; Wight Ic. t. 867; Bot. Reg. t. 281; Bot. Mag. t. 3700; Miq. Fl. Ind. Bat. II. 984; Hook. f. Fl. Br. Ind. IV. 691. *Phlomis nepetifolia*, Linn. Sp. Pl. 586; Roxb. Fl. Ind. III. 8 (sph. *repetifolia*).

In some of the provinces, as an escape.—DISTRIB. Tropical Africa, where probably indigenous, but also widespread in South-eastern Asia and occurring in Tropical America.

14. LEUCAS, R. Br.

Herbs or undershrubs. Flowers medium or small, in dense axillary, usually distant, less often terminal whorls. Calyx 10-nerved, often striate; mouth equal or oblique; teeth 6 to 10, usually unequal. Corolla-tube not exerted, annulate or not within; lower lip 3-fid, spreading, mid-lobe large; upper lip erect, concave, villous externally. Stamens 4, didynamous, the upper pair shorter, ascending under upper lip; anthers connivent; cells divaricate, ultimately confluent. Disk entire or lobed, uniform or enlarged anteriorly. Style subulate; upper lobe minute or obsolete. Nutlets ovoid, triquetrous, obtuse.—DISTRIB. Species about 100, chiefly in Tropics of Old World.

Whorls numerous, distant, axillary; calyx-teeth long, slender; corolla small; tube not annulate within 1. *L. martinicensis*.
 Whorls few, usually all or nearly all terminal; calyx-teeth short; corolla medium; tube annulate within near the middle:—

Whole plant sparingly beset with hispidulous hairs; calyx-mouth obliquely campanulate, not contracted; teeth erect .. 2. *L. zeylanica*.

Whole plant smooth, finely puberulous; calyx-mouth projecting above in a large triangular lip, with the small teeth ascending along its margins, the mouth below forming a rounded sinus 3. *L. larandulifolia*.

1. *LEUCAS MARTINICENSIS*, R. Br. Prodr. 504 (1810). A tall, stout, annual herb, 2 to 4 ft. high, more or less branched. *Stem* and branches hirsute, 4-angled and 4-grooved, angles rounded. *Leaves* opposite, membranous, hirsute above and below, ovate, oblong or wide-lanceolate, obtuse; base cuneate, rarely rounded, entire; margin elsewhere widely and rather deeply crenate; 2·5 to 3·5 in. long, 1 to 1·75 in. wide; petiole hirsute, 4 to 7 in. long. *Flowers* sessile, in numerous, distant, axillary, globose, many-flowered whorls which are 75 to 1·25 in. across; the floral leaves decreasing upwards, especially in width of blade and length of petiole; bracteoles green, 25 to 35 in. long, narrowly linear-lanceolate or subulate, spinescent at their tips with pale slender awns. *Calyx* 4 in. (in fruit 6 in.) long, tubular, sigmoid, pubescent externally; tube within glabrous and closely reticulate; mouth with a few short villi within, oblique; teeth 10, all lanceolate, ciliate, with fine spinescent tips; the uppermost largest, 2 in. long; the others alternately longer and shorter, 1 and 12 in. long. *Corolla* white, small, 35 in. long; tube 2 in. long, not annulate within; lower lip spreading, the lateral lobes oblong rounded, wider than the oblong 2-fid central; upper lip erect, white-villous. *Nutlets* 1 in. long, obovoid-oblong, obliquely truncate at apex, angular on inner face, rounded on outer, dark-brown, shining. Benth. in Wall. Pl. As. Rar. I. 60, in Lab. Gen. & Sp. 617, and in DC. Prodr. XII. 533; Miq. Fl. Ind. Bat. II. 983; Hook. f. Fl. Br. Ind. IV. 688. *L. polycephala*, Wall. Cat. 2051. *Phlomis martinicensis*, Sw. Prodr. Veg. Ind. Occ. 88.

PERAK: in waste places, *Scortechini*!—DISTRIB. Tropical America; Tropical and South Africa; India and Indo-China.

An introduced and as yet apparently a rare plant in our area.

2. *LEUCAS ZEYLANICA*, R. Br. Prodr. 504 (1810). An erect annual herb, 6 to 20 in. in height, simple or branched. *Stems* and branches 4-angled, hispidulous with scattered spreading hairs. *Leaves* opposite, decussate, membranous, dark-green above, uniformly but sparsely beset

with spreading hispidulous hairs, paler and subglaucescent beneath, with spreading hispidulous hairs on the nerves, the hairs on both sides curved towards leaf-apex, ovate-lanceolate, or occasionally lanceolate, acute; base long-cuneate, entire; margin elsewhere entire or remotely and sparingly serrate; 1.5 to 3 in. long, .25 to .5, rarely .75 in. wide; petiole .1 to .2 in. long, hispidulous. *Flowers* sessile or subsessile, in terminal usually 6- to 8-leaved whorls .5 to .75 in. across, occasionally also axillary whorls occur below; bracts .25 in. long, linear, spinescent, hispidulous along the margin with stiff spreading hairs. *Calyx* .2 in. (in fruit .3 in.) long, turbinate, slightly curved; the tube below glabrous or faintly pubescent externally, above beset with scattered, spreading, hispidulous hairs; the mouth subcampanulate, oblique, distinctly transversely veined between the 10 nerves, and sparingly pubescent within with short white hairs, the uppermost of which project beyond the limb; teeth 8, the uppermost .05 in. long, slightly longer than the others, all subulate, spinescent at the tip. *Corolla* white, medium, .5 in. long; tube .25 in. long, glabrous below, enlarged upwards where pubescent externally, annulate within near the middle; lower lip patent, the mid-lobe large, shortly widely clawed, the lateral lobes small; upper lip obovate, white-woolly. *Nutlets* .15 in. long, obovoid-oblong; apex subtruncate; inner face angular, outer rounded; dark-brown or black, shining. Benth. in Wall. Pl. As. Rar. I. 60, in Lab. Gen. & Sp. 614, and in DC. Prodr. XII. 531; Wight III. t. 176; Hook. f. Fl. Br. Ind. IV. 689. *L. involucreta*, Benth. in Wall. Cat. 2047. *L. dimidiata*, Benth. in DC. Prodr. XII. 532 (probably not of Spreng. Syst. II. 743). *L. nutans*, Benth. in Wall. Pl. As. Rar. I. 60 (not of Spreng.); Wall. Cat. 2523 (not of Spreng.). *L. malayana*, Hance in Walp. Ann. III. 269. *L. bancana*, Miq. Fl. Ind. Bat. Suppl. 572; Hallier f. Ann. Jard. Bot. Buitenz. XIII. 293. *L. aspera*, Hook. f. Fl. Br. Ind. IV. 690 (in part; not of Spreng.). *Phlomis zeylanica*, Linn. Sp. Pl. ed. 2, 820. *Leonurus Marrubiastrum*, Burm. Fl. Ind. 127 (not of Linn.).

SINGAPORE: in waste places, frequent, *G. Thomson*! *Kurz* 2906! *Deschamps*! MALACCA: *Griffith*! — *DISTRIB.* Throughout South-eastern Asia.

3. *LEUCAS LAVANDULIFOLIA*, Smith in Rees Cyclop. XX. n. 2 (1819). An erect, slender, annual herb, 1 to 2 ft. high, usually branching. *Stems* and branches 4-angled, finely adpressed-puberulous. *Leaves* opposite, herbaceous, finely puberulous on both surfaces, rather pale-green, linear-lanceolate, less often lanceolate, subacute; base tapering gradually from about the middle, entire; margin elsewhere entire in linear-lanceolate leaves, sometimes remotely and sparingly serrate in lanceolate ones; petiole usually very short or obsolete, rarely as much as .35 in. long.

Flowers subsessile or shortly pedicelled, in axillary and terminal but always leafy whorls, and always towards apex of stem and branches, .4 to .6 in. across; bracts .2 to .3 in. long, narrowly linear, subspinescent, finely puberulous. *Calyx* .35 in. (in fruit .45 in.) long behind, .2 to .25 in. long in front, sparingly puberulous or glabrous externally; tube curved; mouth pubescent within with adpressed white short hairs, contracted, very oblique, rounded below, and forming above a large acute lobe much produced forward and tipped by a minute spinescent tooth; the remaining teeth variable in number, also minute, distant, erect along the oblique margin, usually 3, occasionally 4, sometimes only 2 on each side, with often a small tooth in the centre of the rounded sinus opposite the acute posterior lobe. *Corolla* white, medium, .5 in. long; tube .25 in. long, annulate within near the middle; lower lip patent, the mid-lobe large, obovate, rounded, lateral lobes small; upper lip oblong, white-woolly. *Nutlets* .12 in. long, oblong, rounded at apex; inner face angular, outer rounded; pale-brown, dull. *L. linifolia*, Spreng. Syst. II. 743 (1825); Wall. Cat. 2048; Benth. in Wall. Pl. As. Rar. I. 60, in Lab. Gen. & Sp. 617, and in DC. Prodr. XII. 533; Miq. Fl. Ind. Bat. II. 983; Hook. f. Fl. Br. Ind. IV. 690. *Phlomis linifolia*, Roth Nov. Sp. 260 (1821). *P. zeylanica*, Roxb. Fl. Ind. III. 9; Jacq. Ic. Pl. Rar. I. 11, t. 111 (not of Linn.). *Leonurus indicus*, Burm. Fl. Ind. 127. *Herba admirationis*, Rumph. Herb. Amboin. VI. t. 16, f. 1.

PENANG: Penara Bukit, Curtis 1115! SINGAPORE: in cultivated ground, G. Thomson! Kunstler 48! — DISTRIB. South-eastern Asia generally; Mascarenes (Madagascar, Mauritius, Réunion, Seychelles).

The calyx-mouth of this species has been described in works of much authority as glabrous within; it is pubescent within.

15. LEONURUS, Linn.

Stout, erect, leafy herbs, with lobed leaves. *Flowers* small, in densely congested, axillary distant whorls. *Calyx* turbinate, 5-nerved, with 5 spreading spinescent teeth. *Corolla-tube* naked or annulate within; lower lip 3-fid, with obcordate mid-lobe; upper lip entire, erect. *Stamens* 4, didynamous, ascending under upper lip, lower pair longer; anthers connivent; the cells parallel, transverse. *Disk* uniform. *Style* equally 2-fid; the lobes obtuse or subulate. *Nutlets* smooth, dry, truncate at the apex.—DISTRIB. Species 10; almost cosmopolitan.

LEONURUS SIBIRICUS, Linn. Sp. Pl. 584 (1753). A rather coarse annual herb, with obtusely 4-angled, furrowed, usually softly pubescent stems, 2 to 6 ft. high. *Leaves* opposite, herbaceous, palmatipartite, with linear incised segments, dark-green and glabrous or nearly so

above, paler and more or less pubescent on the nerves beneath; 1.5 to 4 in. long, 1 to 3 in. wide; petiole 1 to 2 in. long. *Flowers* in axillary whorls; the upper floral leaves usually entire; bracts .5 in. long, spinescent. *Calyx* .25 in. (in fruit .35 in.) long, glabrous or sparingly pubescent; tube .2 in. long; teeth spinescent from a shortly triangular base. *Corolla* .4 to .5 in. long, red; tube .25 in. long, annulate within; lower lip 3-lobed, mid-lobe obcordate, the lateral lobes rounded; upper lip obovate, galeate, entire, pubescent. *Filaments* exserted. *Nutlets* .1 in. long, triquetrous, truncate. Wall. Cat. 2071; Benth. in DC. Prodr. XII. 501; Miq. Fl. Ind. Bat. II. 978; Hook. f. Fl. Br. Ind. IV. 678. *L. tataricus*, Burm. Fl. Ind. 127; Roxb. Fl. Ind. III. 8 (not of Linn.)

In some of the provinces, in waste places; an introduced weed of waysides and waste places.—DISTRIB. Originally Asiatic, now almost cosmopolitan.

Though described by Bentham, and by Hooker, *l.c.*, as not annulate, the corolla-tube of this species is distinctly annulate within. The annulus is slightly oblique, rather higher anteriorly, and is slightly imperfect, there being a small hiatus behind where the style comes in contact with the corolla-tube.

16. PARAPHLOMIS, Prain.

Herbs or shrubs. *Leaves* membranous. *Flowers* medium, yellow or whitish, in dense axillary, many-flowered whorls; bracteoles numerous, filiform. *Calyx* 10-nerved, equally 5-toothed; tube slightly incurved. *Corolla-tube* annulate within; upper lip erect, pubescent externally, quite glabrous within; lower lip spreading, 3-lobed. *Stamens* 4, ascending under upper lip, lower pair longer; all filaments without basal appendages; anthers connivent; cells divaricate. *Disk* uniform, entire. *Style* 2-fid, lobes subequal or the upper shorter than lower. *Nutlets* obovoid, triquetrous below, rounded above, glabrous.—DISTRIB. Species 3; two Malayan, one extending from the Eastern Himalaya to the Philippines.

PARAPHLOMIS RUGOSA, Prain in Ann. Roy. Bot. Gard. Calc. IX. i. 60 (1901). A coarse shrubby plant, 2 to 3 ft. high. *Stems* stout or slender, minutely hirsute with deflexed hairs. *Leaves* opposite, membranous, dark-green above, paler beneath, glabrous or with minute scattered hairs on the upper surface, elliptic or oblong-ovate, acuminate; base cuneate or truncate, entire; margin elsewhere shortly toothed, 6 to 8 in. long, 3 to 4 in. wide; petiole slender, 2 to 4 in. long. *Flowers* in small distant or rather approximate whorls, axillary and

also often many on the stem below the leaves, .75 to 1.25 in. across; bracteoles filiform, glabrescent, rather shorter than the calyx, .3 in. long. *Calyx* .4 in. (in fruit .5 in.) long, obconic-campanulate; tube slightly curved forwards, glabrous upwards where thickly membranous, usually hispid towards the coriaceous base; teeth 5, slender, lanceolate, from a triangular membranous base, two-thirds the length of the tube, glabrous. *Corolla* pale-yellow or white, 1 in. long, with a distinct annulus within; both lips pubescent externally; lower 3-lobed with oblong mid-lobe and lanceolate lateral lobes; upper narrow, rounded at apex, half the length of the tube, glabrous within. *Filaments* all devoid of basal appendages. *Style-arms* subequal. *Nutlets* .25 in. long, obovoid, acute below and triquetrous, rounded above, glabrous. *Phlomis rugosa*, Benth. in Wall. Cat. 2067, in Wall. Pl. As. Rar. I. 63, in Lab. Gen. & Sp. 634, and in DC. Prodr. XII. 545; Hook. f. Fl. Br. Ind. IV. 693; Prain Ann. Roy. Bot. Gard. Calc. III. 231; IX. i. 60. *Gomphostemma membranifolium*, Miq. Fl. Ind. Bat. II. 988.

PERAK: Kinta, on limestone rocks, *King's Collector (Kunstler)* 7095! *Scortechini*!—DISTRIB. Eastern Himalaya; Indo-China; Malay Archipelago; Philippines.

The specific name applied to this plant by Mr. Bentham is, as Sir Joseph Hooker remarks, wholly inapplicable. Its characters are so different from those of the genus *Phlomis*, and its habit so unlike that of any member of that genus, that it is necessary to consider it the type of a distinct genus.

17. GOMPHOSTEMMA, Wall.

Coarse, stellately pubescent or tomentose perennial herbs or shrubs. *Roots* sometimes tuberous. *Flowers* large or medium, in 6- to 24-flowered whorls, sessile and densely or peduncled and laxly cymose; bracteoles lanceolate or linear. *Calyx* campanulate, 10-nerved, subequally 5-toothed. *Corolla-tube* slender; throat inflated; limb 2-lipped; lower lip spreading, broadly 3-lobed; upper lip galeate, entire or emarginate. *Stamens* 4, pubescent, the lower longer, all ascending; anthers connivent in pairs, 2-locular; cells transverse, parallel. *Disk* subequal or gibbous behind. *Style* 2-fid; the lobes subulate, the anterior slightly the longer. *Nutlets* drupaceous, glabrous or pubescent, the pericarp usually fleshy and white, with a broad hilum; rarely all developed.—DISTRIB. Species 26, South-eastern Asiatic.

Corolla with almost straight tube and narrow throat; calyx-tube hispidly hairy within; ovary glabrous; nutlets solitary, glabrous (§ STENOSTOMA):—

- Calyx-teeth triangular, much shorter than the tube; whorls few-flowered, densely congested; flowers yellow .. 1. *G. microcalyx*.
 Calyx-teeth linear-subulate, longer than the tube; whorls many-flowered, laxly cymose; flowers yellow .. 2. *G. crinitum*.
 Corolla with distinctly incurved tube and wide-campanulate throat; nutlets 4 (§ *EUGOMPHOSTEMMA*):—
 Calyx-tube hirsute within, ribbed, green; ovary villous; nutlets hispid at apex:—
 Corolla yellow; style hirsute; calyx-teeth longer than tube .. 3. *G. Scortechinii*.
 Corolla white; style usually glabrous; calyx-teeth not longer than tube .. 4. *G. oblongum*.
 Calyx-tube glabrous within, not ribbed, reddish; corolla white; nutlets quite glabrous, punctulate .. 5. *G. Curtisii*.

Sect. 1. *STENOSTOMA*, Prain. *Corolla-tube* straight, glabrous within, longer than the calyx, the limb narrow, the lips small. *Nutlets* usually solitary, smooth.

1. *GOMPHOSTEMMA MICROCALYX*, Prain Journ. As. Soc. Beng. LIX. ii. 316 (1890). A coarse perennial herb, 3 to 5 ft. high. *Stems* stout, erect, sulcate, woody, hoary-pubescent or scabrid. *Leaves* opposite, herbaceous, dark-green above, hoary beneath, finely closely stellate-pubescent on both surfaces, oblong-ovate, acute; base cuneate, entire; margin elsewhere entire or widely and minutely toothed; 4·5 to 6 in. long, 3 to 3·5 in. wide; petiole of lower leaves 1·5 to 2 in., of upper leaves ·5 in. long, scabrid. *Flowers* in dense, few-flowered whorls in the axils of the lower leaves and on the bare stem below the leaves; bracts ovate-lanceolate, entire, ·25 in. long, ·12 in. wide. *Calyx* ·3 in. long; teeth short, triangular, less than half as long as the tube. *Corolla* yellow, 1·25 in. long, slightly puberulous externally; the throat very narrow. *Style* and ovary glabrous. *Nutlets* smooth, glabrous. Ann. Roy. Bot. Gard. Calc. III. 251.

PERAK: Larút, 1800 to 2000 ft. elev., *King's Collector* (*Kunstler*) 2155! *Scortechinii* 842! *Wray* 835! Ulu Bubong, *King's Collector* 10455!

Nearest to *G. parviflorum*, Wall., but with a much smaller calyx with diminutive teeth and a much narrower corolla. *G. parviflorum*, though stated by Benthams, Miquel, and Hooker to occur in Penang, has never been met with in our area. The specimens on which the statement is based were collected by Wallich, who in 1828 issued them as the types (Lith. Cat. n. 2159-1) of his own species *G. crinitum*, to which they most undoubtedly belong. A year later Wallich referred these same specimens (as n. 2158-c) to his own *G. parviflorum*; this quite erroneous afterthought has been accepted by the three authors referred to.

2. *GOMPHOSTEMMA CRINITUM*, Wall. Cat. 2159 (1828). A coarse perennial herb, 3 to 4 ft. high. *Stems* stout, erect, sulcate, woody,

hoary-pubescent or scabrid. *Leaves* opposite, herbaceous, dark-green, pubescent above, hoary beneath with a close stellate tomentum, or softly pubescent, elliptic-ovate or oblanceolate, acute; base cuneate, entire; margin elsewhere entire or serrate; 8 to 12 in. long, 2.5 to 5 in. wide; petiole .5 to 1.5 in. long, scabrid. *Flowers* in rather lax, rarely condensed, many-flowered axillary cymes; bracts lanceolate, ovate-lanceolate or linear, .5 to .75 in. long. *Calyx* .7 to .75 in. long; teeth long, linear-subulate, considerably longer than the tube. *Corolla* yellow, 1.25 in. long, slightly puberulous externally; the throat narrow. *Style* and ovary glabrous. *Nutlets* smooth, glabrous.

VAR. *typica*. Bracts all lanceolate-acute or linear, almost as long as the calyx; leaves closely tomentose beneath; petioles 1.5 in. long. *G. crinitum*, Wall. Cat. (*uti supra*); Benth. in Wall. Pl. As. Rar. II. 12, in Lab. Gen. & Sp. 648, and in DC. Prodr. XII. 552; Miq. Fl. Ind. Bat. II. 987; Hook. f. Fl. Br. Ind. IV. 698 (*partly*); Prain Ann. Roy. Bot. Gard. Calc. III. 254. *G. parviflorum*, Benth. Lab. Gen. & Sp. 648, and in DC. Prodr. XII. 551; Miq. Fl. Ind. Bat. II. 987 (*not of* Wall.).

PENANG: Wallich 2159/1! PERAK: Kampong Kota, Wray! Sungei Ujong, Ridley 1870!—DISTRIB. Indo-China.

VAR. *Griffithii*, Prain Ann. Roy. Bot. Gard. Calc. III. 254. Outer bracts ovate-lanceolate obtuse, distinctly shorter than the calyx; leaves softly pubescent beneath; petioles .5 in. long.

MALACCA: Mount Ophir and Chabu, Griffith 4042! PERAK: Gunong Ijok, Scortechini 5! Ulu Kwangsa, Scortechini 928!

Sect 2. EUGOMPHOSTEMMA, Prain. *Corolla-tube* incurved, glabrous within, longer than the calyx, the limb campanulate, the lips large. *Nutlets* usually 4, smooth or punctulate.

3. GOMPHOSTEMMA SCORTECHINII, Prain Journ. As. Soc. Beng. LIX. ii. 315 (1890). A coarse perennial herb, 3 to 5 ft. high. *Stems* stout, erect, sulcate, woody, scabrid. *Leaves* opposite, herbaceous, dark-green, sparsely hirsute above, closely tomentose on the nerves, otherwise sparsely tomentose beneath, elliptic-oblong or obovate, acute; base rather long-cuneate; margin entire or serrate; 6 to 12 in. long, 3 to 6.5 in. wide; petiole usually short, sometimes obsolete, occasionally as much as 1 in. long. *Flowers* in many-flowered rather dense axillary whorls; bracts subulate, .2 in. long, as long as the pedicels. *Calyx* .75 in. long, prominently ribbed, hirsute within; teeth lanceolate, longer than the tube. *Corolla* yellow, 2.25 in. long, distinctly incurved, tomentose externally; limb .35 in. wide. *Style* hirsute towards the apex, with spreading hairs; ovary densely villous. *Nutlets* white,

smooth, hispid towards the apex. Ann. Roy. Bot. Gard. Calc. III. 260.

PERAK: Gunong Tujok, *Scortechinii*!; Larut, *Kunstler* 1959!—
DISTRIB. Indo-China.

Very closely related to *G. oblongum*, Wall., of which it appears to be the representative in the Malayan Peninsula. It extends northwards to Tenasserim, and its area thus to some extent overlaps that of *G. oblongum*.

4. *GOMPHOSTEMMA OBLONGUM*, Wall. Cat. 2154 (1828). A coarse perennial herb, 3 to 5 ft. high. *Stems* stout, erect, woody, somewhat 4-angled, densely tomentose. *Leaves* opposite, herbaceous, dark-green, hispidly hairy above, densely pubescent beneath, elliptic-oblong, acute; base rather abruptly cuneate or subtruncate; margin crenate or crenate-serrate; 6 to 12 in. long, 2 to 3.5 in. wide; petiole .35 to 1 in. long, densely tomentose. *Flowers* in rather dense few-flowered axillary whorls; bracts ovate-lanceolate, .25 in. long. *Calyx* .5 in. long, prominently ribbed, hirsute within; teeth lanceolate, not longer than the tube. *Corolla* white, 1.75 in. long, distinctly incurved, tomentose externally except on the mid-lobe of the lower lip; limb .35 in. wide. *Style* glabrous or, when young, sparingly hirsute; ovary villous. *Nutlets* white, smooth, hispid at the apex. Benth. in Wall. Pl. As. Rar. II. 12, in Lab. Gen. & Sp. 648, and in DC. Prodr. XII. 551 (*partly*); Miq. Fl. Ind. Bat. II. 986 (*partly*); Hook. f. Fl. Br. Ind. IV. 697; Prain Ann. Roy. Bot. Gard. Calc. III. 261.

ANDAMANS: Port Blair, not uncommon.—DISTRIB. Indo-China.

This species is very closely related to *G. Scortechinii*, from which it differs mainly in its rather smaller white flowers and its less hirsute or quite glabrous style. It has not yet been collected in any of the Malayan provinces, but having regard to the fact that *G. Scortechinii* extends northwards to Tenasserim, where *G. oblongum* is common, and thus invades the area in which *G. oblongum* occurs, it is not impossible that this species may yet be met with in the northern part of the Malayan Peninsula; it seems therefore advisable to give it a place in these *Materials*.

5. *GOMPHOSTEMMA CURTISII*, Prain Journ. As. Soc. Beng. LIX. ii. 315 (1890). A coarse perennial herb, 3 to 4 ft. high. *Stems* rather weak, flexuous, ascending, scabrid. *Leaves* opposite, the pairs rather remote, herbaceous, dark-green, hirsute above, adpressed-tomentose beneath, oblong-ovate, acute; base very shortly cuneate; margin denticulate; 3 to 5 in. long, 2 to 2.75 in. wide; petiole 1.25 to 4.5 in. long, adpressed-tomentose. *Flowers* in many-flowered lax axillary cymes; bracts narrow-ovate, long-acuminate, entire, reddish, .4 to .6 in. long. *Calyx* .5 in. long, smooth, glabrous within, reddish; teeth lanceolate-subulate from a short wide base, longer than the tube. *Corolla* white, 1 in. long, distinctly incurved, puberulous externally; limb .3 in.

wide. *Style* glabrous; ovary glabrous. *Nutlets* white, glabrous, punctulate. Ann. Roy. Bot. Gard. Calc. III. 266.

PENANG: *Curtis* 1310! PERAK: *Larút*, *Scortechini* 924! *Wray* 1233!

18. CYMARIA, Benth.

Shrubs. *Flowers* small, in lax, many-flowered, peduncled, raceme-like cymes, all axillary, or the upper ones forming a terminal thyrsoïd panicle. *Calyx* erect, 10-nerved, the intermediate nerves weaker than the other 5, equally 5-toothed; the tube in fruit urceolate; the throat within naked or with a few setose hairs. *Corolla-tube* straight, exserted; limb 2-lipped; lower lip 3-lobed, spreading, the mid-lobe larger than the lateral; upper lip arched, erect. *Stamens* 4, ascending under the upper lip, didynamous, the upper pair shorter; anthers connivent, the cells divaricate. *Disk* equal, entire. *Style-arms* unequal, the upper very short. *Nutlets* subglobose or obovoid, rugosely pitted; hilum very large, lateral.—DISTRIB. Species 3, in Indo-China and Malaya.

CYMARIA DICHOTOMA, Benth. in Wall. Cat. 2080 (1828). A shrub, 2 to 3 ft. high. *Stems* and branches faintly 4-angled, finely pubescent. *Leaves* opposite, membranous, dark-green and almost glabrous except on the pubescent nerves above, paler, glandular, and closely grey-pubescent beneath, ovate or rhomboid, acute or subacute, rarely acuminate; base cuneate, decurrent on the petiole, entire; margin elsewhere distinctly to faintly crenate or sometimes subentire; 1·5 to 4 in. long, 1 to 2·25 in. wide; petiole ·25 to ·75, rarely 1 in. long, finely pubescent. *Flowers* in once, or sometimes twice, dichotomously branching cymes with terminal flowers and 6 to 12 secundly arranged flowers on each branch; the main peduncles ·5 to 1 in. long, finely pubescent; the flower-bearing branches ·6 to 1·5 in. long; bracts under branches spatulate-acute to lanceolate, ·1 to ·2 in. long; bracteoles subulate, ·05 in. long, finely pubescent. *Calyx* in flower campanulate, ·08 in. long, in fruit urceolate, ·15 in. long, glandular and pubescent, especially on the nerves externally, within sparingly beset with white setose hairs above the constriction; teeth 5, equal, triangular, as long as the portion of tube above the constriction; pedicels slender, finely pubescent, ·05 in. long. *Corolla* yellow, ·16 in. long, uniformly finely pubescent externally; tube distinctly exserted; lower lip spreading, 3-lobed, mid-lobe wide-oblong; upper lip erect, oblong; the apex notched. *Filaments* ascending under upper lip, included. *Nutlets* obovoid, ·03 in. long, wide-reticulate on back, the upper third glandular; the apex beset with very short white hairs. Benth. in Wall. Pl. As. Rar. I. 64, in Lab. Gen. & Sp. 705, and in DC. Prodr. XII. 603; Miq. Fl. Ind. Bat. II. 992; Hook. f. Fl. Br. Ind. IV. 705; Prain Journ. As. Soc. Beng. LXVI. ii. 522.

PERAK: on limestone hills, *Scortechini*! Ipoh Quarries, *Ridley* 9734! Marble Hill, Ipoh, *Fox* (*Ridley* 10686)!—DISTRIB. Burma.

The Perak specimens have rather more numerous flowered cymes than those from Burma, but are in other respects indistinguishable.

Family XCII. PLANTAGINACEÆ.

[By D. PRAIN.]

Annual or perennial scapigerous herbs. *Leaves* usually radical; scapes axillary. *Flowers* small, greenish, bracteate, often dimorphic, spicate. *Sepals* 4, imbricate in bud, persistent. *Corolla* scarious, hypogynous; lobes 4, short, imbricate in bud. *Stamens* 4, inserted on the corolla-tube or hypogynous; filaments filiform, persistent; anthers large, pendulous, versatile. *Ovary* superior, 1- to 4-celled; ovules in each cell 1 to 8. *Capsule* 1- to 4-celled, membranous: dehiscence circumscissile. *Seeds* 1 or more, usually attached by the centre; testa thin, mucilaginous; albumen fleshy; embryo cylindric, transverse; radicle inferior.—DISTRIB. Species under 100; cosmopolitan.

PLANTAGO, Linn.

Annual or perennial herbs with a dense rosette of radical *leaves*. *Flowers* small, greenish, in dense spikes. *Sepals* 4, free, imbricate, persisting. *Corolla* 4-lobed, scarious; lobes short, imbricate. *Stamens* 4, adnate to corolla-tube; filaments filiform; anthers 2-celled, versatile. *Ovary* superior, 2- to 4-celled; ovules one or more in each cell. *Fruit* a small membranous capsule; dehiscence circumscissile. *Seeds* peltate, albuminous, mucilaginous.—DISTRIB. Species under 100, mainly in temperate regions.

PLANTAGO MAJOR, Linn. Sp. Pl. 112 (1753). A perennial herb with an erect stout rhizome. *Leaves* alternate, spirally disposed, all radical, sometimes sparsely pubescent, sometimes nearly glabrous on both sides, ovate or ovate-oblong, obtuse or subacute; base long-cuneate, tapering to and decurrent on the petiole; margin often irregularly and somewhat abruptly toothed; 3- to 7-, usually 5-nerved; 1 to 5 in. long, very variable in width; petiole often longer than the leaf-blade, broad and sheathing at the base. *Flowers* crowded or dispersed in slender rather lax spikes 2 to 6 in. long; bracts .05 to .08 in. long, broadly ovate-oblong, obtuse, with scarious margins. *Calyx* .12 in. long, glabrous; sepals oblong, obtuse or subacute, bluntly keeled externally,

margins widely scarious. *Corolla* .18 in. long, glabrous; lobes lanceolate-acute, reflexed. *Capsules* ovoid, .12 to .15 in. long, glabrous, dehiscing horizontally a little above the base, the upper portion separating as a conical lid tipped by the remains of the style. *Seeds* 4 to 8, angular, rugulose, dull, blackish, length .03 in. Dene. in DC. Prodr. XII. 696; Miq. Fl. Ind. Bat. II. 709; Hook. f. Fl. Br. Ind. IV. 705. *P. asiatica*, Linn. Sp. Pl. 163; Wall. Cat. 6412; Wall. in Roxb. Fl. Ind. ed. Carey & Wall. I. 423.

SINGAPORE: *Hullett*; *Kurz*. PENANG: *Walker*. MALACCA: *Griffith*.
—DISTRIB. Almost cosmopolitan. In our area doubtless an introduced plant.

ERRATA.

P. 642, line 20, for "4. CARDANTHERA, Voigt.," read "4. CARDANTHERA, Ham. MS." Line 7 from bottom, for "CARDANTHERA TRIFLORA, Voigt," read "CARDANTHERA TRIFLORA, Ham. MS. in Voigt."

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MATERIALS

FOR A

FLORA OF THE MALAYAN PENINSULA.

BY

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Late Superintendent of the Royal Botanic Garden, Calcutta,

AND

J. SYKES GAMBLE, C.I.E., F.R.S.,
Late of the Indian Forest Department.

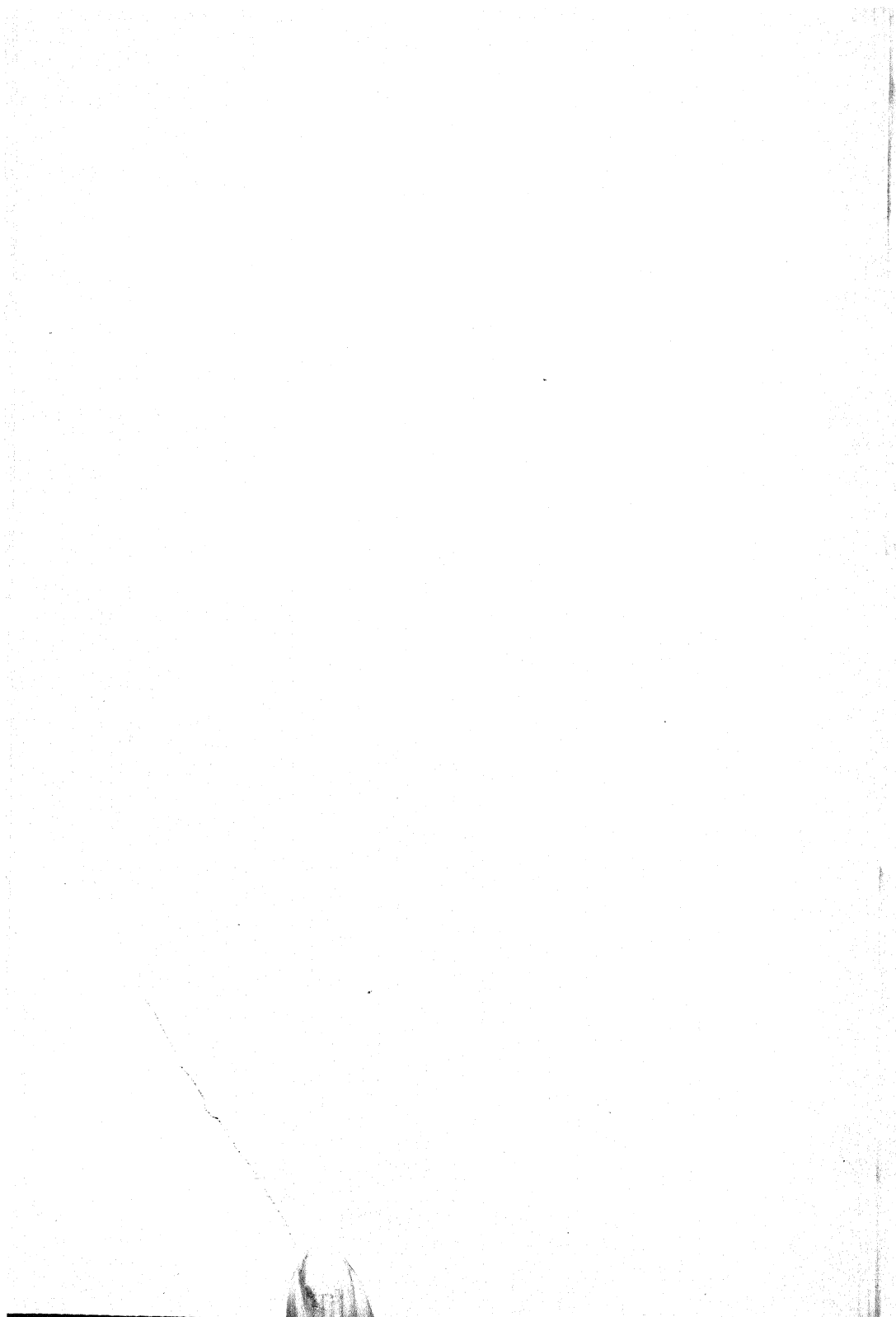
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JOURNAL

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Materials for a Flora of the Malayan Peninsula.—By SIR GEORGE KING, K.C.I.E., LL.D., F.R.S., late Superintendent of the Royal Botanic Garden, Calcutta, and J. SYKES GAMBLE, C.I.E., F.R.S., late of the Indian Forest Department.

No. 21.

THIS Part contains two Families, No. 86 *Gesneraceæ* and No. 90 *Verbenaceæ*, and completes the account of the Gamopetalæ. The account of the *Gesneraceæ* was prepared by Mr. H. N. Ridley, F.R.S., Director of the Botanic Garden at Singapore, and was published in the 'Journal of the Straits Branch of the Royal Asiatic Society for 1905.' The material used by him was that of the Herbaria of Singapore and Penang, together with that belonging to the Royal Botanic Garden of Calcutta, and chiefly got together by collectors employed by Sir George King, lent to Mr. Ridley for the purpose. The account in the 'Straits Journal' not being quite in the form used in the 'Materials,' published under the auspices of the Asiatic Society of Bengal, has been edited by Mr. Gamble, with the kind help of Lt.-Col. Prain, of Kew, but he has been careful to make no more formal alterations than could be helped; so that the work is one for which Mr. Ridley alone is responsible. Only numbers personally verified or quoted by Mr. Ridley have been entered under the different species. Mr. Ridley, who has sanctioned what has been done, has himself furnished a few notes and additions, among them being descriptions of 3 new species, one of them the representative of a new genus. The number of species of *Gesneraceæ* herein described is 131, belonging to 20 genera, 1 genus and 2 species being new, besides 1 Sumatran species newly described.

The *Verbenaceæ* have been done by Mr. Gamble. It comprises 15 genera and 72 species, of which 16 species are new to science. Two Malay Islands species are also described.

In accordance with the Rules adopted at the Vienna Conference, Latin diagnoses are appended to the new genus and the 3 new species of *Gesneraceæ*, those for *Verbenaceæ* have been published in the Kew Bulletin.

Family LXXXVI.—GESNERACEÆ.

Herbs or shrubs, usually pubescent. *Leaves* opposite or apparently alternate, one of each pair being much reduced, simple entire or lobed. *Inflorescence* axillary, cymose or racemose or paniced; bracts small or large. *Calyx* of 5 sepals, often connate. *Corolla* tubular or campanulate, more or less distinctly bilabiate, 5-lobed; lobes oblong or rounded. *Stamens* 4 or 2, rudimentary or absent, didynamous when four; filaments linear or filiform, or short and thick; anthers linear or oblong, or scutiform, connivent in pairs, 2-celled; cells splitting on the inner face. *Disk* cylindric or annular or absent. *Ovary* cylindric or oblong; style slender, simple; stigma capitate, cordate or bilobed. *Fruit* a capsule, linear, cylindric, fusiform or oblong, splitting dorsally. *Seeds* very numerous, minute, plumed in epiphytic species, elliptic and not plumed in terrestrial species; or a fleshy berry (*Cyrtandra*).—DISTRIB. Species about 600, all tropical with a few in subtropical climates.

Seeds with one or more hairs from near hilum, and a single hair from apex; fruit dehiscent, a cylindric capsule:—

Stamens 4 perfect	..	..	..	1. <i>ÆSCHYNANTHUS</i> .
Stamens 2 perfect	..	..	..	2. <i>AGALMYLA</i> .

Seeds without hairs:—

Fruit dehiscent, a capsule, follicle or pyxidium:—

Capsules or follicles cylindric or rarely (*Loxocarpus*) conic:—

Corolla funnel-shaped:—

Stamens 4	3. <i>DIDISSANDRA</i> .
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Stamens 2:—

Capsule linear.

Stigma entire, ovate or capitate	4. <i>DIDYMOCARPUS</i> .
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Stigma 2-fid	5. <i>CHIRITA</i> .
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Capsule lanceolate or ovate	6. <i>TETRAPHYLLUM</i> .
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Corolla shortly campanulate:—

Stamens 2:—

Fruit a conic follicle	7. <i>LOXOCARPUS</i> .
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Fruit a cylindric capsule:—

Capsule straight	8. <i>PARABOEIA</i> .
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Capsule twisted:—

Calyx 5-lobed	9. <i>BOEA</i> .
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Calyx 3-lobed	10. PHYLLOBOEA.
Stamens 4	11. BOEICA.
Capsules or pyxidia ovoid or ellipsoid :—	
Stamens 2 :—	
Sepals free to the base :—	
Stem very short; calyx-lobes linear	12. ORCHADOCARPA.
Stem elongate; calyx-lobes ovate	13. LEPADANTHUS.
Sepals connate half-way up in a campanulate calyx ..	14. RHYNCOGLOSSUM.
Stamens 4 :—	
Fruit with dehiscence circumscissile	15. EPITHEMA.
Fruit splitting irregularly :—	
Herbs :—	
Leaf solitary; flowers minute	16. MONOPHYLLAEA.
Leaves several alternate; flowers large	17. STAURANTHERA.
Shrubs leafy :—	
Sepals free to the base; flowers small	18. RHYNCHOTECHUM.
Sepals connate in a tubular shortly lobed calyx; flowers large	19. CYRTANDROMOEIA.
Fruit indehiscent, baccate; stamens 2	20. CYRTANDRA.

1. *ÆSCHYNANTHUS*, Jack.

Epiphytes or rock-plants, with slender creeping or erect half-woody stems. *Leaves* opposite or whorled, fleshy or coriaceous, entire, ovate or lanceolate. *Flowers* large, usually showy, red yellow or green, in axillary or terminal heads, pedicelled. *Bracts* ovate or lanceolate, small. *Calyx* tubular or campanulate, subentire or more or less lobed, or sepals free to the base. *Corolla* tubular, curved, dilated above, shortly 2-lipped; upper lip of 2 lobes erect; lower of 3 lobes deflexed. *Stamens* 4 perfect, didynamous, usually exsert; anthers connivent in pairs; loculi oblong, parallel. *Ovary* superior, with a short cup-shaped disk at the base; style as long as stamens or shorter; stigma dilate or peltate. *Capsule* long-cylindric; base usually empty and narrower (gynophore), 2-valved loculicidally. *Seeds* innumerable, minute, oblong, rugose, with one or more hyaline scabrid hairs from near the hilum, and one from the apex.—**DISTRIB.** Species about 64, in India, Malaya and Hongkong; chiefly Malayan.

Seeds with a plume of hairs at one end, a single hair at the other (§ *POLYTRICHUM*); sepals free or very nearly so :—

Leaves pink beneath	1. <i>Æ. Motleyi</i> .
Leaves green, with transverse purple bars beneath	2. <i>Æ. marmorata</i> .

Seeds with a single hair at each end (§ *HAPLOTICHUM*) :—

Sepals free or very nearly so :—	
Leaves in whorls of 4 or 5	3. <i>Æ. speciosa</i> .
Leaves crowded towards the ends of the stems, opposite; sepals glabrous	4. <i>Æ. stenophylla</i> .
Leaves opposite in pairs :—	

- Corolla-tube 2-3 in. long:—
 Sepals pubescent 5. *Æ. longistora*.
 Sepals glabrous 6. *Æ. perakensis*.
 Corolla-tube under 1 in. long 7. *Æ. Hildebrandii*.
 Sepals distinctly connate below:—
 Calyx tubular, its mouth distinctly 5-lobed:—
 Stems erect or pendent, not rooting at the nodes:—
 Calyx 1 in. long, lobes under .5 in. long .. 8. *Æ. rhododendron*.
 Calyx 1.25 in. long, lobes .5 in. long .. 9. *Æ. longicalyx*.
 Stems creeping, rooting at the nodes:—
 Leaves glabrous 10. *Æ. Lobbiana*.
 Leaves pubescent 11. *Æ. radicans*.
 Calyx cupular or campanulate, mouth entire or sub-entire:—
 Calyx green, cupular 12. *Æ. Wallichii*.
 Calyx red, widely obconic 13. *Æ. obconica*.

1. *ÆSCHYNANTHUS MOTLEYI*, Clarke in DC. Monog. Phan. V. i. 20 (1883). Epiphytic woody plant; branches erect or pendulous, about 12 to 18 in. long. *Leaves* opposite, fleshy; lanceolate or ovate-lanceolate, acute; margins undulate or not; upper surface light green, lower pink; 3 to 4 in. long, .5 to 1.5 in. broad; petiole .25 in. long. *Flowers* solitary or few, axillary, pendulous; pedicels .25 in. long or less. *Calyx*-tube short, .125 in. long; lobes .75 to 1 in. long, glabrous, blackish-red. *Corolla*-tube .75 to 1.25 in. long, dilated upwards and at the base, light green; lobes rounded, sparingly hairy, the tips of the petals dark purple-brown. *Stamens* brown; filaments glabrous. *Ovary* oblong, with 5 glandular patches at base; style very short, cylindric; stigma capitate. *Capsule* cylindric, narrowed at the tip, 9 to 13 in. long. *Seed* .06 in. long, oblong, blunt, pustular; plume .5 in. long. Ridley in Journ. Linn. Soc. XXXII. 500, and in Journ. Str. Br. R. As. Soc. No. 43, 12.

PERAK: Larut Hills, Kurau and Batang Padang, Wray 245, 1475; *Scortechini*; Goping, Kinta, *King's Collector* 4463. PAHANG: Pulau Manis, Pahang River, *Ridley* 2151. JOHORE: Batu Pahat, *Ridley*. SINGAPORE: Chanchu Kang, *Ridley* 6244.—DISTRIB. Sumatra, Borneo, Celebes, Ceram.

2. *ÆSCHYNANTHUS MARMORATA*, T. Moore in Paxt. Fl. Gard. III. 56 (1852-53). An epiphyte, with erect woody stems about 12 in. high. *Leaves* fleshy, lanceolate, acute, narrowed at the base; light green on the upper surface with lighter variegations, dull green with transverse purple bars on the lower; petiole .25 in. long. *Flowers* solitary or few together, axillary; pedicels slender, .25 in. long. *Calyx*-tube very short (hardly any); lobes linear, pubescent, .35 to .4 in. long. *Corolla*-

tube a little over 1 in. long, dilated upwards, curved; lobes rounded, pubescent, green with brown bars in the mouth. *Stamens* 1·5 in. long; filaments hairy. *Style* hairy; stigma bilobed. *Capsule* 6 in. long, rather thick. *Seed* oblong, pustular; plume ·5 in. long. N. E. Brown in Gard. Chron. XVIII. 787 (1882); Clarke in DC. Monog. Phan. V. i. 38; Ridley in Journ. Linn. Soc. XXXII. 500, and in Journ. Str. Br. R. As. Soc. No. 43, 13. *Æ. zebrina*, Van Houtte Cat. (1851).

KEDAH: at Gunung Raya, Langkawi Islands, *Curtis* 2142. PENANG: Government Hill, *Curtis* 1700; *Ridley*.—DISTRIB. Burma (Mergui), Siam.

3. *ÆSCHYNANTHUS SPECIOSA*, Hook. Bot. Mag. t. 4320 (1847). A shrubby plant, with erect rather stout stems about 1 ft. high. *Leaves* fleshy, in whorls of 4 to 5, lanceolate, acute; margins smooth or undulate; 3 to 6 in. long, ·75 to 1·75 in. broad; petiole ·125 to ·25 in. long. *Flowers* large, showy, subterminal, clustered 10 or more together; bracts linear-lanceolate, hairy, ·25 in. long; pedicels slender, ·5 in. long. *Calyx*-lobes linear, free to the base, pubescent, ·5 in. long. *Corolla*-tube 3 in. long, narrow-cylindric at base, enlarged and curved above; lobes rounded, all pubescent. *Stamens* ·5 in. long, longer than the corolla-tube; filaments slender, slightly pubescent. *Style* stout, pubescent. Paxt. Mag. XIV. 199; Fl. des Serres Ser. I. t. 267; Miq. Fl. Ind. Bat. II. 718; Clarke in DC. Monog. Phan. V. i. 33; Ridley in Journ. Linn. Soc. XXXII. 499, and in Journ. Str. Br. R. As. Soc. No. 43, 14.

PERAK: Bruseh, near Bidor, *W. G. Napier*. SELANGOR: Bukit Hitam, *Kelsall*; Tomoh, *Machado*.—DISTRIB. Java, Sumatra (*Forbes* 2526), Borneo.

4. *ÆSCHYNANTHUS STENOPHYLLA*, Ridley, n. sp. *Stem* slender, 1 to 2 ft. long; internodes ·5 in. long. *Leaves* fleshy, glabrous, crowded towards the top of the stems; linear lanceolate, subacute, slightly narrowed at base; 2 in. long, ·25 in. broad. *Flowers* solitary in the axils of the leaves; pedicels very short, angular, glabrous, ·25 in. long. *Calyx*-lobes linear, acute, glabrous, ·125 in. long. *Corolla* (only one bud seen) small, pubescent. *Capsule* papery, linear, cylindric, 1 ft. long. *Disk* annular. *Seeds* with a single long white hair ·75 in. long.

PERAK: at Goping Kinta, at 500 to 800 ft. elevation, found growing on the hollow branch of a large tree, *King's Collector* 4738.—DISTRIB. Sumatra? (*Forbes* 2535).

[*ÆSCHYNANTHUS STENOPHYLLA*, Ridley, n. sp. *Caulis* gracilis, 30 ad 60 cm. longus, 1 ad 1·5 cm. intra nodos. *Folia* carnosae, glabra, versus apicem caulis congesta; lineari-lanceolata, subacuta, ad basin attenuata; 5 cm. longa, 6 mm. lata. *Flores* in axillis foliorum solitariae; pedicelli brevissimi, angulares, glabri, 6 mm. longi. *Calyces* lobi lineares, acuti, glabri, 3 mm. longi. *Corolla* parva, pubescens. *Capsula* chartacea,

linearis, cylindrica, 30 cm. longa; discus annularis. *Semina* pilo unico albo 2 cm. longo munita.

PENINSULA MALAYANA in Prov. Perak, circa 1500 ad 2500 m. alt.]

5. *ÆSCHYNANTHUS LONGIFLORA*, DC. Prodr. IX. 262 (1845). An erect woody plant, with stem over 1 ft. high. *Leaves* opposite, in distant pairs, fleshy; ovate, acuminate, shortly narrowed at base; 5 in. long by 2 in. wide; petiole .5 in. long. *Flowers* several, terminal, in a cluster; pedicels hairy, .5 in. long. *Calyx*-lobes narrowly linear, .5 in. long, puberulous, free nearly to the base. *Corolla*-tube scarlet, 3 in. long, cylindric at base, dilated above, hairy; lobes short, rounded. *Stamens* .75 in. longer than corolla-tube; filaments slender, pubescent. *Style* rather stout. *Capsule* cylindric, narrow, over 6 in. long. Hassk. Cat. Hort. Bogor. ed. 2, 154; Hook. Bot. Mag. t. 4328; De Vriese Pl. Ind. Bat. Reinw. 9; Fl. des Serres Ser. 1, t. 288; Paxt. Mag. XV. 25; Miq. Fl. Ind. Bat. II. 717; Clarke in DC. Monog. Phan. V. i. 32; Ridley in Journ. Linn. Soc. XXXII. 499, and in Journ. Str. Br. R. As. Soc. No. 43, 14. *Lysionotus longiflora*, Bl. Bijdr. 766.

PAHANG: on trees along the Tahan River, *Ridley* 2167.—DISTRIB. Java.

6. *ÆSCHYNANTHUS PERAKENSIS*, *Ridley* in Journ. Linn. Soc. XXXII. 449 (1895). A shrubby epiphyte, with stems about 2 ft. long. *Leaves* coriaceous; lanceolate, acuminate; 3 to 7 in. long, 1 to 2 in. wide; nerves inconspicuous. *Flowers* in a terminal fascicle, on pedicels nearly .5 in. long; bracts subulate, .125 in. long. *Calyx*-lobes linear, .25 in. long, glabrous, free to the base. *Corolla*-tube deep red, 2 to 2.5 in. long, narrow at the base, dilated and curved upwards, nearly glabrous; lobes rounded. *Stamens* .75 in. longer than corolla-tube; filaments glabrous or sparingly pubescent. *Capsule* more than 1 ft. long. *Seed* narrowly oblong, pustular, with a single hair at each end. *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 15.

PERAK: in Larut Hills at 5500 ft., *Ridley*; *Curtis* 11447; *King's Collector* 2337, 7022; at Sungei Ryah, *King's Collector* 3641; at Thai-ping, *King's Collector* 8314.

7. *ÆSCHYNANTHUS HILDEBRANDII*, Hemsl. in Bot. Mag. t. 7365 (1894). A shrubby epiphyte; branches about 6 in. long, often rooting. *Leaves* fleshy, in distant pairs, glabrous, sessile; ovate, acute, base rounded; margins ciliate and with distant glands .5 in. long and broad. *Flowers* few, terminal at the ends of the branches; pedicels .25 in. long. *Calyx*-lobes free to the base, linear, acuminate, pubescent, .15 to .2 in. long. *Corolla*-tube thick, curved, little dilated, .75 in. long, glabrous, orange in colour; lobes short, red, rounded, pubescent. *Stamens* shortly exsert,

hairy. *Capsule* 6 in. long; base narrowed, sterile. Ridley in Journ. Linn. Soc. XXXII. 502, and Journ. Str. Br. R. As. Soc. No. 43, 15.

PERAK: Larút Hills, at 4500 ft., *Ridley*; at Gunong Ijuk, *Scortechini* 1187. PAHANG: Kluang Terbang and Gunong Benom, *Barnes*.—
DISTRIB. Burma.

8. *ÆSCHYNANTHUS RHODODENDRON*, Ridley in Journ. Linn. Soc. XXXII. 500 (1895). An erect epiphytic shrub, 1 to 2 ft. high; stems stout, woody. *Leaves* opposite, in distant pairs, fleshy-coriaceous; ovate, acuminate; 2 in. long, 1·5 in. wide; nerves inconspicuous; keel prominent. *Flowers* several together, axillary and terminal; pedicels about ·5 in. long. *Calyx* tubular, deep purple, 1 in. long; lobes short, acute, glabrous. *Corolla* 3 in. long; tube thick, dilated above, glabrous; lobes oblong, rounded, ·5 in. long, pubescent, deep red with 3 black streaks on the lower lobes. *Stamens* very shortly exsert, little longer than the corolla, pubescent. *Capsule* cylindric, rather stout, 4 in. long; base narrowed into a gynophore. *Seeds* with a single hair at each end, brown, scabrid. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 15.

PERAK: Larút Hills at 2500 to 6000 ft. elevation, *Ridley*; *Curtis* 1311; *Scortechini* 58, 388; Plus River, *Scortechini* 468; *King's Collector* 2332.

9. *ÆSCHYNANTHUS LONGICALYX*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 16 (1905). *Stems* woody, over 1 ft. long. *Leaves* thick, fleshy, glabrous; ovate, acuminate; 2 to 3 in. long, 1 to 1·5 in. broad; midrib prominent; nerves obscure. *Flowers* large, terminal; pedicels ·5 in. long. *Calyx* elongate, tubular, glabrous, red, 1·25 in. long, with 5 long thin lanceolate acute lobes ·5 in. long. *Corolla* red with dark blotches in the mouth, 3 in. long, glabrous without; mouth pubescent; lobes rounded. *Stamens* nearly as long as corolla, pubescent. *Style* stout, pubescent; stigma capitate.

PERAK: *Scortechini* 36; at Gunong Batu Putih, *Wray* 1636. SELANGOR: Semangko Pass, *A. M. Burn-Murdoch*.

10. *ÆSCHYNANTHUS LOBBIANA*, Hook. Bot. Mag. t. 4260 (1846). A climbing epiphyte, with slender stems rooting along tree-trunks. *Leaves* in pairs, coriaceous, lanceolate or ovate-lanceolate, glabrous; 1·5 to 2 in. long, ·25 to ·75 in. broad; petioles short. *Flowers* in axillary and terminal fascicles 3 to 5 together; pedicels slender, ·75 in. long or less. *Calyx* tubular, 1 in. long, dark purple, thickly pubescent; lobes very short. *Corolla*-tube 2 in. long, thick, curved; lobes deep red, thickly pubescent, broad, rounded. *Stamens* barely exserted. *Capsule* 13 in. long, cylindric on a gynophore. *Seed* very small, oblong, pustular, with a hyaline mass at the hilum, and a single long white hair at each end. Fl. des Serres Ser. 1, t. 246; Miq. Fl. Ind. Bat. II. 721; Clarke in

Hook. f. Fl. Br. Ind. IV. 343, and in DC. Monog. Phan. V. i. 44; Ridley in Journ. Str. Br. R. As. Soc. No. 43, 16.

KEDAH: at Gunong Jerai, *Ridley* 5513; at Gunong Raya, Langkawi, *Curtis* 2503. PENANG: on Government Hill, *Curtis*. PERAK: in Larút Hills to 5000 ft. alt., *Curtis*; *Wray* 873; *Scortechini* 36, 39, 330, 352. PAHANG: at Pekan, *Ridley*; at Kuautan, *Durnford*. SELANGOR: on Pahang track, *Ridley*. MALACCA: *Maingay* (K.D.) 1218, 1219; Mount Ophir and Ayer Panas, *Ridley* 1572. JOHORE: at Batu Pahat, *Ridley*; at Gunong Pulai, *G. King*; at Jambu Larang, *Fielding*. SINGAPORE: at Sungei Tengeh, *Ridley* 2710, at Kranji, *Ridley* 2706.—DISTRIB. Java, Sumatra, Borneo.

King's Collector No. 2636, from Larút, Perak, is a specimen with very fleshy leaves, but cannot yet be separated from *E. Lobbiana*, as there are in the series intermediates between it and the thin-leaved forms. It seems to occur only at high elevations.

11. *ÆSCHYNANTHUS RADICANS*, Jack in Trans. Linn. Soc. XIV. 43 (1823). An epiphytic plant growing on trees or rocks, the hairy stems creeping and rooting at the nodes, several feet long. *Leaves* hairy, shortly petioled; ovate, obtuse, broad at base; .5 to 1.25 in. long, .5 to .75 in. wide. *Flowers* axillary, 1 to 2 together; pedicels .5 in. long. *Calyx* tubular, hairy, deep red; lobes obtuse or subacute, .75 in. long. *Corolla* red, thick, curved, hairy; lobes subacute, glabrescent within. *Stamens* hardly exsert; filaments glabrous. *Capsule* cylindric, pubescent, acuminate, slender, 10 in. long. Calc. Journ. Nat. Hist. IV. 62; Spreng. Syst. II. 838; R. Br. in Benn. Pl. Jav. Rar. 115, and in Ann. Sc. Nat. 2, Vol. XIII. 160; DC. Prodr. IX. 202; De Vriese Pl. Ind. Bat. Reinw. 10; Miq. Fl. Ind. Bat. II. 720; Clarke in Hook. f. Fl. Br. Ind. IV. 343, and in DC. Monog. Phan. V. i. 41; Ridley in Journ. Linn. Soc. XXXII. 501, and in Journ. Str. Br. R. As. Soc. No. 43, 17. *Trichosporum radicans*, Nees in Flora (1825), 144; Blume Bijdr. 764.

PERAK: Bujong Malacca, *Ridley*; Sungei Rayah, *Scortechini* 37. TRINGGANU: Bundi, *Rostado*. MALACCA: *Griffith* (K.D.); *Cuming* 2387; Sungei Rambai, *Derry* 205; Sungei Ujong, *Cantley*.—DISTRIB. Sumatra, Java, Borneo.

VAR. *lanuginosa*, *Ridley*. *Calyx* green, densely white woolly, as is the outside of the corolla-tube.

PERAK: *Scortechini* 330.

12. *ÆSCHYNANTHUS WALLICHII*, R. Br. in Benn. Pl. Jav. Rar. 116 (1840). *Stems* rather slender, woody, glabrous. *Leaves* glabrous; lanceolate or elliptic, acuminate, narrowed at the base into the petiole; 3 in. long, 1 to 1.25 in. wide; petiole .25 in. long. *Flowers* few together,

subterminal; pedicel .25 in. long, slender. *Calyx* small, cupshaped, green, .25 in. long, hairy, almost entire. *Corolla* dark red, .75 in. long; tube stout; lobes rather large, rounded, hairy. *Stamens* included; filaments glabrous. *Capsule* 8 in. long, narrow, terete. Ann. Sc. Nat. 2. XIII. 160; Clarke in Hook. f. Fl. Br. Ind. IV. 343, and in DC. Monog. Phan. V. i. 48; Ridley in Journ. Linn. Soc. XXXII. 502, and in Journ. Str. Br. R. As. Soc. No. 43, 18. *Æ. radicans*, Wall. Cat. 798A (non Jack).

PERAK: Bujong Malacca, *Curtis*; Tapa, *Wray* 1417. MALACCA: Mount Ophir, *Lobb*, *Maingay* (K.D.) 1219. JOHORE: Tanjong Kopang, *Ridley*; Ulu Batu Pahat, *Kelsall*. SINGAPORE: *Wallich* 798A; Bukit Mandal, Chanchu Kang, Kranji, *Ridley*.—DISTRIB. Sumatra, Borneo.

13. *ÆSCHYNANTHUS OBCONICA*, Clarke in DC. Monog. Phan. V. i. 50 (1883). *Stems* about a foot long or more, woody, glabrous. *Leaves* in pairs, coriaceous, glabrous; elliptic oblong or ovate, acuminate, narrowed at base into the petiole; 1.5 to 3 in. long, .75 to 1.25 in. broad; petiole .25 in. long. *Flowers* subterminal, a few in a cluster; pedicels .25 in. long, hairy. *Calyx* deep red, obconic, wide, hairy, .25 in. long; mouth entire. *Corolla* .5 in. long; tube thick and short; lobes rounded, hairy, deep red with yellowish-white central bars. *Stamens* very shortly exert; filaments nearly glabrous. *Capsule* 8 in. long, cylindric. Clarke in Hook. f. Fl. Br. Ind. IV. 343; Bot. Mag. t. 7336; Ridley in Journ. Linn. Soc. XXXII. 501, and in Journ. Str. Br. R. As. Soc. No. 43, 18.

PERAK: Batu Kuran and Bujong Malacca, *Curtis* 2990, 3335; Larut Hills, *Ridley* 2905; Blanja and Relan Tujor, *Wray* 149, 1772; *Scortechini* 28, 1861; Larut Peak at 2000 to 3000 ft., *King's Collector* 2012, 2849, 10179. DINDINGS: Pangkore, *Curtis* 1338. SELANGOR: Klang, *Beccari*.—DISTRIB. Borneo (*Motley* 687 fide *Hook. f.*).

The following Sumatran species is herein described.

ÆSCHYNANTHUS FORBESII, Ridley, nov. sp. An epiphytic shrub; *stems* creeping; branches slender, about a foot long. *Leaves* opposite, fleshy; ovate-lanceolate, acute; 2 to 2.5 in. long, .5 in. broad; midrib elevated, other nerves inconspicuous; petiole .2 in. long. *Flowers* subsolitary, axillary; pedicels .2 in. long. *Calyx*-lobes free to the base, extremely short, linear or acuminate, tips setiform, .2 in. long. *Corolla*-tube nearly .75 in. long, slightly curved and dilated upwards, pubescent, scarlet. *Style* hairy.

SUMATRA: Mount Dempo, 5700 ft., *Forbes* 2268. Rather remarkable for its very small calyx lobes.

[*ÆSCHYNANTHUS FORBESII*, Ridley, nov. sp. Frutex epiphyticus; caules reptantes, ramis 30 cm. longis gracilibus. Folia opposita, carnosa, ovato-lanceolata, acuta; 5–6 cm. longa, 10–15 mm. lata; præter costam elevatam nervis inconspicuis; petioli 5 mm. longi. Flores subsolitaria axillares; pedicelli 5 mm. longi. Calycis lobi ad basin liberi, brevissimi, lineares vel acuminati, 5 mm. longi, apicibus setiformibus. Corollæ tubus

ad 2 cm. longus, paullo curvatus et sursum dilatatus, pubescens, coccineus. *Stylus* pubescens.

SUMATRA : ad Montem Dempo 1700-1800 m. alt. calycis lobis minimis distincta.]

2. AGALMYLA, Blume.

Climbing epiphytic shrubs, with loose bark. *Leaves* alternate, long petioled, herbaceous, lanceolate or ovate-lanceolate. *Flowers* showy, scarlet, in compact axillary cymes. *Calyx* deeply 5-cleft; lobes narrow, acute. *Corolla* tubular, ventricose above, 2-lipped; lobes 5, ovate, obtuse. *Stamens* 2 perfect, long exsert; filaments slender; anthers connivent, imperfect; staminodes 2 to 3. *Disk* annular, thick. *Ovary* superior, linear, glabrous; style as long as or longer than the stamens; stigma 2-lipped. *Capsule* linear, long, 2-valved loculicidally. *Seeds* small, oblong, with a single hair at each end.—DISTRIB. Species 3, in the Malay Peninsula and Archipelago.

1. AGALMYLA STAMINEA, Blume Bijdr. 767 (1826). *Stems* very long, twining, hairy, at length glabrous. *Leaves* light green; elliptic-oblong, acuminate at both ends; lower surface strigose; 8 to 12 in. long, 3 to 4 in. broad; main nerves 8 to 10 pair; petiole 6 to 8 in. long, hairy. *Cymes* subsessile; bracts lanceolate; pedicels strigose. *Calyx* .5 in. long; lobes lanceolate, acute, pubescent, free nearly to base. *Corolla* 1 in. long, curved, dilated, scarlet, pubescent; lobes short, rounded. *Stamens* exsert for 1 in., glabrous; anthers oblong. *Style* stout, often very short, glabrous. *Capsule* 14 in. long, slender. R. Br. in Benn. Pl. Jav. Rar. 116, and in Ann. Sc. Nat. 2, XIII. 161; DC. Prodr. IX. 263; Hook. Ic. Pl. t. 733; De Vriese Pl. Ind. Bat. Reinw. 10; Hook. Bot. Mag. t. 5747; Fl. des Serres Ser. 1, t. 358; Miq. Fl. Ind. Bat. II. 722; Clarke in DC. Monog. Phan. V. i. 56; Ridley in Journ. Linn. Soc. XXXII. 502, and in Journ. Str. Br. R. As. Soc. No. 43, 19. *Justicia parasitica*, Lam. Ill. I. 42 (non Vahl). *Cyrtandra staminea*, Vahl Enum. I. 105.

PERAK : Larút Hills, Curtis 2042, and Ridley 2916; Maxwell's Hill, 3000 ft., Fox and Scortechini 295; Wray 2800; at 1000 to 3500 ft. King's Collector 2053, 2349, 2396, 6970.—DISTRIB. Java, Sumatra (Forbes 1864, 1948).

3. DIDISSANDRA, Clarke.

Shrublets or herbs, with short or tall stems, hairy. *Leaves* opposite, in remote pairs or crowded at the tip. *Flowers* solitary on subterminal peduncles or several on short axillary peduncles; bracts small, usually arrow. *Calyx*-lobes 5, free to the base or nearly so, lanceolate or ovate. *Corolla* blue, white, pink or yellow, narrowly tubular, dilated upwards,

occasionally broadly tubular, infundibuliform; limb bilobed, usually unequally; lobes rounded. *Stamens* 4 perfect, in two pairs; filaments long, slender; anthers ovate or elliptic adhering by their faces; cells parallel, connective sometimes prolonged into a horn. *Disk* annular, small. *Ovary* cylindric, sessile; style as long or longer; stigma broad, ovate. *Capsule* cylindric, linear elongate, rarely short and thick, sessile, splitting along the upper edge, not twisted.—*DISTRIB.* Species about 20, in India, in the Malay Peninsula and Sumatra.

Stems tall; nodes distant; flowers several together in axillary clusters; leaves hairy above:—

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|---------------------------------|----|----|----|---------------------------|
| Leaf-margins entire | .. | .. | .. | 1. <i>D. johorica</i> . |
| Leaf-margins minutely crenulate | .. | .. | .. | 2. <i>D. frutescens</i> . |

Stems short; leaves crowded at apex; flowers 1, rarely 2 or more, on subterminal peduncles:—

Leaves hairy above, their margins serrate or dentate:—

Capsule slender, cylindric:—

Sepals lanceolate acuminate, .25 in. long:—

- | | | | | |
|------------------------------------|----|----|----|-----------------------------|
| Leaves simply serrate | .. | .. | .. | 3. <i>D. hirta</i> . |
| Leaves doubly serrate | .. | .. | .. | 4. <i>D. serratifolia</i> . |
| Sepals oblong-ovate, .125 in. long | .. | .. | .. | 5. <i>D. atrocyanea</i> . |

Capsule short, thick, fusiform	6. <i>D. latiseptala</i> .
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Leaves glabrous above:—

Leaf-margins entire, sinuate or obscurely crenulate:—

Flowers orange	7. <i>D. flammea</i> .
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Flowers violet-purple:—

Corolla-tube slender, infundibuliform	8. <i>D. violacea</i> .
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Corolla-tube wide, cylindric	9. <i>D. atropurpurea</i> .
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Leaf-margins serrate, or dentate, or lobed:—

Sepals glabrous:—

Leaves simply dentate; corolla white with violet markings, pubescent

.. 10. *D. Wrayi*.

Leaves runcinate; corolla lemon-yellow, glabrous

11. *D. quercifolia*.

Sepals more or less pubescent:—

Leaves coarsely serrate; sepals linear lanceolate

.. 12. *D. glabrescens*.

Leaves deeply lobed; sepals elliptic

.. 13. *D. filicina*.

1. *DIDISSANDRA JOHORICA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 22 (1905). Shrubby, 2 to 3 ft. high; stems pustular below, hairy above. *Leaves* alternate below, opposite above; lanceolate, acuminate, long-cuneate at base; margins entire; upper surface sprinkled with short conic hairs, lower shortly scabrid-hairy; 6 in. long, 1.25 in. broad; main nerve 6 to 7 pairs, ascending. *Cymes* axillary; peduncles slender, hairy, 1 in. long; bracts short, linear lanceolate; flowers 3 to 4 to each peduncle. *Calyx*-lobes small, linear lanceolate, acute, hairy.

Corolla pink. *Capsule* slender, cylindric, hispid, 1.5 in. long. *D. sp.*, Ridley in Journ. Linn. Soc. XXXII. 502.

JOHORE: at Gunong Panti, *Ridley* 4175.

2. *DIDISSANDRA FRUTESCENS*, Clarke in DC. Monog. Phan. V. i. 67, t. VII (1883). A shrub with woody stems, 3 to 4 ft. high; stems appressed hairy. *Leaves* opposite, in alternate pairs, distant; elliptic-lanceolate to oblanceolate, subacute at apex, cuneately narrowed at base; margins minutely crenulate; upper surface sprinkled with fine hairs, lower with appressed tawny silky hairs, especially on the nerves and reticulations; 7 to 9 in. long, 3 to 4 in. broad; main nerves about 12 to 20 pair; petiole 1.5 to 3 in. long, hairy. *Cymes* axillary, sessile, with short hairy branches 1 in. long; flowers 1 to 3 to each branch. *Calyx*-lobes red, hairy, narrow, lanceolate. *Corolla* white, 1.5 in. long; tube funnel-shaped, pubescent; lobes rounded. *Anthers* ovoid; filaments curved in the middle. *Ovary* glabrous; style pilose; stigma sub-bilobed. *Capsule* slender, cylindric, 3 in. long, glabrous, longitudinally ribbed. Clarke in Hook. f. Fl. Br. Ind. IV. 355; Ridley in Journ. Linn. Soc. XXXII. 502, and in Journ. Str. Br. R. As. Soc. No. 43, 21. *Didymocarpus frutescens*, Jack in Malay Misc. 1, part 2, 5, in Trans. Linn. Soc. XIV. 39, and in Calc. Journ. Nat. Hist. IV. 58 (1844); Wall. Cat. 780; R. Br. in Benn. Pl. Jav. Rar. 119, and in Ann. Sc. Nat. 2, XIII. 165; DC. Prodr. IX. 265; Miq. Fl. Ind. Bat. II. 726. *Henckelia frutescens*, Spreng. Syst., *cura post.* 13.

PENANG: *Wallich* 780; *Curtis* 828; *Deschamps*. PERAK: at Tapa, *Wray* 826, at Waterfall Hill, *Wray* 1723; *Ridley* 2912; *Scortechini*; near Kinta River, *King's Collector* 837. DINDINGS: at Lumut, *Ridley* 7171. MALACCA: *Griffith* (K.D.) 3856; *Maingay* (K.D.) 1222.—DISTRIB. Sumatra.

3. *DIDISSANDRA HIRTA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 28 (1905). *Stem* woody, 3 in. long. *Leaves* oblanceolate, oblique, acuminate at apex, narrowed to the base; margins serrate; upper surface sprinkled with pale multicellular hairs, especially long on the marginal teeth; lower glabrous except on the midrib and nerves, which are covered with rather long multicellular hairs. *Scape* 3 to 4 in. long, hairy with catenulate multicellular hairs. *Calyx*-lobes .25 in. long, lanceolate, acuminate, very hairy. *Corolla* violet with a darker centre; tube 1 in. long, broad-cylindric, sprinkled with multicellular hairs; lobes large, rounded, .5 in. long, glabrous. *Stamens* 2 pairs, unequal. *Stigma* capitate.

PERAK: at Bujong Malacca, *Ridley*.

4. *DIDISSANDRA SERRATIFOLIA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 25 (1905.) *Stem* woody, 4 to 5 in. high, covered in the upper part with red hairs. *Leaves* opposite, oblanceolate, acuminate at apex,

long-cuneate at base; margins doubly serrate; upper surface sprinkled with pale multicellular hairs, lower glabrous except for the red multicellular hairs on the nerves and midrib; 6 to 10 in. long, 1.75 to 2.25 in. broad; main nerves 16 to 20 pairs; petiole 1 in. long or less, hairy. *Flowers* solitary on a slender hairy 4 in. long peduncle. *Calyx*-lobes lanceolate, acuminate, .25 in. long, recurved, at length covered densely with red multicellular hairs. *Corolla* blue, 1.5 in. long; tube narrowed at the base, dilated upwards, broad, sparingly hairy; lobes rounded, the lower ones longer than the upper. *Stamens* in 2 subequal pairs, half as long as the corolla-tube; filaments attached close to the base, sinuate. *Style* stout; stigma capitate. *Capsule* 1.5 in. long, subcylindric, thick, .125 in. broad, glabrous.

PERAK: at Bujong Malacca, *Ridley* 9779.

5. *DIDISSANDRA ATROCYANEA*, *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 26 (1905). *Stem* woody, about 6 in. high. *Leaves* crowded at the top of the stem, oblong or lanceolate-oblong, inæquilateral at the base; margins strongly serrate; black when dry; upper surface sprinkled with conical processes formed by the pushing in of the leaf from the under surface, each process bearing a short pale hair; lower surface punctate and marked with the mouths of the intrusions, glabrous except for the nerves and reticulations, which are covered with rufous hairs; 4 to 5 in. long, 1 to 2 in. broad; petiole winged to the base, covered with multicellular hairs. *Flowers* solitary on 3 in. long peduncles covered with red hairs. *Calyx*-lobes oblong ovate, glabrescent or with red hairs, .125 in. long. *Corolla* deep purple with almost black mouth, nearly 2 in. long; tube shortly narrowed at base, broadly cylindric above, pubescent; lobes short, rounded, the lower lip the longer. *Stamens* 4; filaments slender. *Capsule* glabrous, cylindric, curved, 1 to 2 in. long.

PERAK: at Bujong Malacca, *Ridley*, *Curtis* 3298; *Scortechini* 368, 1896; at Gunong Batu Putih, *Wray* 310.

6. *DIDISSANDRA LATISEPALA*, *Ridley* in Journ. Linn. Soc. XXXII. 503 (1895). *Stem* short, woody. *Leaves* crowded at the top of the stem, oblong-ob lanceolate, unequal at base; margins crenate-dentate; surfaces sparingly hispid, red; midrib and nerves beneath covered with red hairs; 7 in. long, 2 in. broad; petiole 1 in. long. *Flowers* few on a 6 in. long hispid peduncle. *Calyx*-lobes ovate, .125 in. long, glabrous. *Corolla* purple (?), 1 in. long, glabrous; tube cylindric, dilated upwards; lobes short, rounded. *Stamens* 4; filaments linear; anthers subglobose. *Ovary* glabrous; stigma clubbed. *Capsule* short, .5 in. long, thick, fusiform. *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 26.

LEGEH: *Machado*.

7. *DIDISSANDRA FLAMMEA*, Ridley in Journ. Linn. Soc. XXXII. 503 (1895). *Stem* about 2 in. long, hardly woody, pubescent. *Leaves* oblong, obtuse, glabrous; upper surface shining; margins and nerves beneath hairy; 4 in. long, 1.25 in. wide; petiole short, pubescent. *Flowers* few, pendulous on an erect stout, purple, pubescent peduncle 3 in. long. *Calyx*-lobes narrowly lanceolate, acuminate, green with purple hairs, .5 in. long. *Corolla* orange red with darker red lobes; tube narrow at base, abruptly dilated, cylindric, hairy outside; lobes short, rounded, the lower ones a little longer. *Stamens* in 2 pairs; filaments slender, terete, hispid above, white; anthers globose. *Ovary* white, pubescent, straight; stigma clavate. *Disk* annular. *Capsule* short, cylindric, purple, 1.5 in. long. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 22.

LEGEH: gold mines north of Tringganu, *Machado*.

8. *DIDISSANDRA VIOLACEA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 23 (1905). *Stem* woody, about 6 in. high. *Leaves* tufted at the top of the stem, thin, oblanceolate, subfalcate, narrowed at the base into the petiole, acuminate at apex; margins sinuate; upper surface glabrous; midrib and petiole covered with red multicellular hairs; 4 to 7 in. long, 1 to 2 in. broad. *Flower*-peduncles numerous, erect, 2 to 3 in. long, sparingly red-hairy, 1-flowered; bracts linear-lanceolate, narrow, .25 to .5 in. long, closely appressed to the calyx. *Calyx*-lobes linear-lanceolate, glabrous, .25 to .5 in. long. *Corolla* violet, 1 to 1.5 in. long; tube rather narrow, gradually dilated upwards, sparingly pubescent; lobes unequal, the lower lip the longer. *Stamens* in 2 pairs, the longer pair scarcely one-fourth longer than the shorter. *Ovary* glabrous, rather short; stigma broad. *Capsule* 1.5 in. long, moderately thick, splitting along the upper edge.

PERAK: summit of Gunong Batu Patih, at 6700 ft., *Wray* 383; *Scortechini* 389.

This species comes near to *D. Wrayi*, but has smaller flowers.

9. *DIDISSANDRA ATROPURPUREA*, Ridley in Journ. Linn. Soc. XXXII. 504 (1895). *Stem* woody, 2 in. long. *Leaves* lanceolate or obovate, narrowed at the base, the bases unequal; margin obscurely crenate; upper surface glabrous, lower hairy on the raised nerves; 4 in. long, 1.5 in. broad; petiole 1 to 1.5 in. long. *Flowers* nearly sessile, in pairs on erect, glabrous, purple peduncles 3 to 5 in. long; bracts 2, ovate, .25 to .5 in. long, .125 in. wide, purple. *Calyx*-lobes nearly free to the base, lanceolate, acute, .25 to .35 in. long, glabrous. *Corolla* deep purple, 2 in. long, .5 in. broad, narrowed at the base, widely dilated

above; lobes short, rounded, the lower ones the longer. *Stamens* in 2 pairs; filaments straight; anthers oblong, appressed. *Style* thick, glabrous; stigma clavate. *Capsule* thick, 2 in. long, narrowed at the tip. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 23.

PERAK: on rocks at Hermitage Hill, *Ridley*; at Gunong Inas, *Scortechini* 1327.

Wray 3903, from Gunong Bubu, 5000 ft., "flowers mauve, five white stripes in tube," may be this or a new species near it, but the flowers are solitary on the peduncles.

10. *DIDISSANDRA WRAYI*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 24 (1905). *Stem* woody, bare below. *Leaves* alternate, lanceolate, oblique, acuminate at apex, narrowed at the base into the petiole; dentate on the margin; glabrous on the upper, whitish on the lower surface; 4 to 6 in. long, 1.5 to 2 in. broad; main nerves 16 pairs, raised on both surfaces; midrib and nerves beneath covered with coarse reddish trichomes. *Flowers* solitary, on 3 to 4 in. long slender peduncles from the upper axils, their bases covered with red multicellular hairs; bracts 2, ovate, broad, glabrous, appressed to the calyx, .25 in. long. *Calyx*-lobes broadly lanceolate, obtuse, glabrous, .5 in. long, white. *Corolla* white pencilled with violet, 1.25 to 1.5 in. long; tube thick, over .25 in. through; lobes broad, rounded. *Stamens* 4, didynamous; anthers rounded. *Style* short. *Capsule* slender, 1.5 to 2 in. long, glabrous.

PERAK: summit of Gunong Batu Putih, 6700 ft., *Wray* 334, 353; *King's Collector* 8036.

11. *DIDISSANDRA QUERCIFOLIA*, Ridley in Journ. Linn. Soc. XXXIII. 504 (1895). *Stem* woody, hairy, 6 in. long or less. *Leaves* crowded above, lanceolate-runcinate; base narrowed; upper surface deep green, glabrous; lower glaucous with the midrib and nerves covered with brown hairs; 2 to 8 in. long, 1 to 2 in. broad; petiole 1 in. long or less, hairy. *Flowers* large, 1 to 2 on 6 in. long sparsely hairy peduncles; bracts lanceolate, broad, hispid. *Calyx*-lobes broadly lanceolate, obtuse, green, glabrous. *Corolla* lemon-yellow, glabrous, 2 in. long; tube dilated, cylindric from a narrow base; lobes short, rounded. *Ovary* cylindric; stigma clavate. *Capsule* 3 in. long, glabrous, cylindric. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 26.

PERAK: Bukit Rengas, *Fox* 10683; Maxwell's Hill, 3000 ft., *Scortechini* 292, 300; *Curtis* 2041; *Ridley* 2910.

King's Collector 2171, from Larut Hills, 3000 to 3500 ft., seems to be this, but is much larger, the stem whitish corky, nearly 12 in. long, the peduncles up to 4 or red.

12. *DIDISSANDRA GLABRESCENS*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 24 (1905). *Stem* woody. *Leaves* elliptic-lanceolate or oblanceolate; margins coarsely serrate; upper surface glabrous, lower dotted, glabrous except on the red hairy midrib and nerves; 4 to 7 in. long, 1 to 2.5 in. broad; petiole 1 in. long, hairy. *Flowers* solitary on 4 to 5 in. long hairy peduncles; bracts 1 to 2, lanceolate, oblong, .125 to .25 in. long. *Calyx*-lobes linear-lanceolate, obtuse, hairy, .25 to .5 in. long. *Corolla* mauve (*Wray*), deep blue (*King's Collector*), 1.5 in. long; tube gradually dilated upwards; lobes rounded, pubescent. *Anthers* subglobose. *Stigma* capitate, broad. *Capsule* 1.5 to 2.5 in. long, cylindric, slender.

PERAK: summit of Gunong Batu Putih, 6700 ft., *Wray* 384; do., 2000 to 3000 ft., *King's Collector* 8055; Kinta at 3000 to 3500 ft., *King's Collector* 7191.

13. *DIDISSANDRA FILICINA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 27 (1905). *Stem* woody, pale, rather slender. *Leaves* lanceolate, deeply lobed with oblong rounded lobes about 13 on each side; glabrous above, paler beneath, with red appressed hairs on the midrib; 3 to 5 in. long, 1 to 1.5 in. broad; petiole .5 in. long with red appressed hairs. *Flower* 1 on a slender, red, hairy peduncle 1.5 in. long; bracts very small, ovate, about .1 in. long; pedicel .25 in. long. *Calyx*-lobes elliptic, rounded, dark red, sparingly hairy, .1 to .2 in. long. *Corolla* 1.5 in. long; tube with narrow base, dilated upwards, trumpet-shaped, sparingly pubescent at the base, purple, paler below outside, inside dark purple, with 6 white lines down the base; lower lip longer than the upper; lobes rounded. *Stamens* 4, in 2 pairs, the connective prolonged in a triangular horizontal horn. *Disk* annular. *Capsule* sub-follicular, 1.5 in. long, glabrous.

PERAK: at Gunong Chabang, on rocks overhanging a creek, *Scortechini* 14.

4. *DIDYMOCARPUS*, Wall.

Herbs or usually small shrubs; stems simple or branched, erect or prostrate. *Leaves* herbaceous, opposite or the alternate ones reduced, seldom wanting, ovate or lanceolate, usually pubescent or hairy, petioled. *Peduncles* axillary, bearing one or more flowers in a cyme. *Calyx*-lobes 5, short, free to the base or nearly so. *Corolla* infundibuliform, bilabiate; lobes equal or the lower ones longer than the upper. *Stamens* 2 complete; filaments filiform, rising from about half-way down the tube; anthers reniform, connivent by the edges; staminodes 2, short, hooked. *Ovary* cylindric, passing into the style; stigma capitate or ovate, entire. *Disk* annular or absent. *Capsule* cylindric,

narrow, usually splitting along the upper edge. Seeds numerous, minute, ellipsoid, not plumed.—DISTRIB. Species about one hundred, in India and Malaya.

Sect. I. ELATÆ :—

- Stem tall, branched, shrubby; leaves in distant pairs,
unequal; bract 1, cupshaped 1. *D. corchorifolia*.
Stem long and weak; bracts 2, ovate 2. *D. sulphurea*.
Stem weak :—
Bracts ovate, amplexicaul; flowers yellow 3. *D. citrina*.
Bracts oblong, glabrous; flowers claret colour 4. *D. purpurea*.

Sect. II. DIDYMANTHUS :—

- Stem erect, herbaceous; leaves in distant pairs :—
Flowers very small, .25 in. long, axillary 5. *D. parviflora*.
Flowers medium-sized :—
Flowers yellow :—
Leaves lanceolate acute 6. *D. flava*.
Leaves ovate acuminate 7. *D. ramosa*.
Leaves unequal, narrowly lanceolate 8. *D. flavescens*.
Flowers white :—
Leaves opposite, equal, hairy, ovate :—
Edges pubescent 9. *D. hispida*.
Edges conspicuously red-hairy 10. *D. hirta*.
Leaves lanceolate, thinly pubescent 11. *D. viscida*.
Leaves subglabrous, equal, long-petioled 12. *D. albina*.
Leaves glabrous, unequal :—
Flowers solitary, on short peduncles 13. *D. alternans*.
Flowers in pairs on long peduncles from upper
axils 14. *D. glabrata*.

Stem erect, herbaceous, little-branched; flowers yellow;
corolla cylindric, trumpet-shaped :—

- Leaves petioled, silky, in distant pairs :—
Corolla 2 in. long 15. *D. malayana*.
Corolla 1 in. long 16. *D. albomarginata*.

Leaves crowded above, hairy :—

- Stem slender; flowers small, congested 17. *D. flavobrunnea*.
Stem woody :—
Leaves glabrous, congested at the top, not petioled;
flowers yellow 18. *D. longipes*.
Leaves alternately lanceolate, inæquilateral; flowers
blue 19. *D. inæqualis*.
Leaves crowded or distant, elliptic, petioled;
flowers white 20. *D. alba*.

Sect. III. REPTANTES. Prostrate or creeping herbs. Leaves
in distant pairs, equal or unequal, hairy or pubescent :—

Flowers blue or white, sometimes with yellow streaks :—

- Leaves hairy, rarely glabrous; flower in uppermost
axil, peduncle short 21. *D. reptans*.

Leaves velvety, elliptic:—

Flowers solitary, terminal 22. *D. ophirensis*.

Flowers numerous, on slender pedicels 23. *D. pulchella*.

Flowers orange-yellow:—

Calyx-lobes hairy 24. *D. crocea*.

Calyx-lobes narrow, subglabrous 25. *D. ascendens*.

Sect. IV. *HETEROBÆA*. Stems woody, usually short, with the leaves crowded towards the top, more or less hairy above, and little or not branched. Leaves hairy, silky or rarely glabrous, lanceolate, serrate, narrowed at the base into a winged petiole, alternate. Peduncles slender, axillary in the upper axils, 1- rarely 2-flowered. Bracts usually small, solitary, linear. Corolla large, showy; white crimson or blue, rarely yellow; filaments long, slender. Capsule narrow, cylindric:—

Flowers solitary, bracts very small:—

Leaves glabrous, wrinkled 26. *D. rugosa*.

Leaves tessellate, not wrinkled, obovate, glabrous or with scattered hairs with swollen bases:—

Capsule over 2 in. long 27. *D. platypus*.

Capsule shorter, 1 in. long 28. *D. Kompsobæa*.

Leaves not tessellate, hairy or pubescent.

Leaves broad, covered with close short hairs:—

Flowers white, tipped with crimson 29. *D. quinquerulnæra*.

Flowers deep crimson 30. *D. atresanguinea*.

Leaves narrow, lanceolate, densely hairy, distant; flowers yellow 31. *D. hirsuta*.

Leaves silky pubescent on both surfaces; flowers white, tinged with pink or blue 32. *D. bombycina*.

Leaves crowded, thickly appressed, hairy; flowers white or blue 33. *D. crinita*.

Leaves crowded, covered with short scattered hairs above, deep green with central white bar; flowers white 34. *D. fasciata*.

Flowers in pairs on a long peduncle; bracts very broad 35. *D. venusta*.

Sect. V. *SALICINÆ*. Small shrubby plants with narrow leaves crowded at top. Flowers small:—

Leaves entire 36. *D. densifolia*.

Leaves serrate:—

Flowers .125 in. long, pink 37. *D. salicina*.

Flowers .75 in. long, white with purple outside, yellow in mouth 38. *D. serratifolia*.

Leaves deeply cut, pinnate 39. *D. pectinata*.

Sect. VI. *ACAULES*. Stemless or nearly so; leaves crowded:—

Flowers panicled, lips very unequal 40. *D. violacea*.

Flowers 1- 2-racemose:—

Flowers large, blue 41. *D. lacunosa*.

Flowers small:—

Leaves elliptic, peltate 42. *D. perditæ*.

Leaves obovate, crenulate :—

Capsule very short and broad 43. *D. puncticulata*.

Capsule linear, narrow 44. *D. heterophylla*.

Leaves small, entire, silky 45. *D. pumila*.

Affinity doubtful.

Stem tall; leaves alternate, distant. Panicles small,
adnate to petioles 46. *D. lilacina*.

Sect. I. ELATÆ.

1. *DIDYMOCARPUS CORCHORIFOLIA*, R. Br. in Benn. Pl. Jav. Rar. 119 (1840). A shrub, 4 to 6 ft. high, much branched, with a stout woody stem. *Leaves* opposite but unequal, ovate, subacute, inæquilateral, rounded at base; margins serrate; both surfaces, but especially the under, covered with soft, short, felted hair; 3 to 9 in. long, 1.5 to 5 in. broad; petiole 1 to 3 in. long. *Panicles* lax, axillary, 2 to 3 in. long; peduncles short, pubescent; flowers numerous; bracts cupshaped. *Calyx* cupshaped, .25 in. long, shortly 5-toothed. *Corolla* .75 in. long, white applegreen in the throat or often purplish-white; tube straight, thick; lobes rounded, the upper lip recurved, the base appressed to the broad decurved lower lip which is much longer. *Capsule* cylindric, 1 to 2.5 in. long, pubescent, splitting to near the tip. Ann. Sc. Nat. 2, XIII. 164; Wall. Cat. 792; DC. Prodr. IX. 265; Miq. Fl. Ind. Bat. II. 726; Clarke in DC. Monog. Phan. V. i. 85, and in Hook. f. Fl. Br. Ind. IV. 351; Ridley in Journ. Bot. XXVIII. 68 (1890), and in Journ. Str. Br. R. As. Soc. No. 43, 31.

PENANG: *Wallich* 792; Government Hill, *Curtis* 1239; *Maingay* (K.D.) 1227. SELANGOR: Pahang track and Semangko, *Ridley* 8553. PERAK: Bujong Malacca, *Ridley* 9775, *Curtis* 3130; Gunong Hijau, *Scortechini* 1266; Kinta, at 1500 to 2000 ft., *King's Collector* 7220; 2000 to 3000 ft., *King's Collector* 10979, 10998.

2. *DIDYMOCARPUS SULPHUREA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 32 (1905). A shrubby creeper 6 to 10 ft. long; stem pubescent, branched, with long internodes. *Leaves* opposite but very unequal, one up to 3 in. long by .75 to 1.75 in. broad, the opposite one .5 to .75 in. long, .15 to .25 in. wide; ovate or lanceolate, acute; base unequal, cuneate; margins crenulate dentate; deep green above, purple beneath; nerves 6 to 7 pairs elevated on both surfaces, sprinkled all over on both surfaces with short hairs, more hairy on the back. *Peduncles* axillary, filiform, 4 to 6 in. long, pubescent; branches at the top 2 or 3, each bearing as many flowers; bracts 2 to each pair of flowers, ovate, glabrous, .125 in. long. *Calyx*-lobes elliptic-ovate, obtuse, glabrous. *Corolla* infundibuliform, .5 in. long, glabrous; upper lip short recurved, lower one longer. *Stamens* shortly exsert; filaments thick, pubescent.

Style stout; stigma excavate at the top. *Capsule* 1.5 to 3 in. long, rather thick, cylindric, acuminate, glabrous.

PERAK: Gunong Hijau, Gunong Chabang and Gunong Bubu, *Scortechini* 6; Gunong Batu Patih, at 3000 to 4000 ft., *King's Collector* 8059; do. 4500 ft., *Wray* 219; Bujong Malacca, *Ridley* 9774.

VAR. *breviflora*, *Ridley l.c.* Bracts and calyx-lobes narrower, acute, pubescent. *Corolla* smaller, .25 to .5 in. long. *Capsule* pubescent, .75 in. long.

SELANGOR: Bukit Kutu, *Ridley* 7582.

3. *DIDYMOCARPUS CITRINA*, *Ridley* in Journ. Linn. Soc. XXXII. 508 (1895). A soft weak herb, about 1 ft. high, pubescent. *Leaves* soft, opposite but unequal, the larger 2 to 3 in. long, 1.25 in. wide; ovate or ovate-lanceolate; velvety; margins crenulate; petiole .5 to 3 in. long. *Panicles* axillary, 3 in. long, pubescent at base, glabrate above; bracts ovate cordate, acute, nearly amplexicaul, polished green with red edges; pedicels .5 to 1 in. long, terete, glabrous. *Calyx*-lobes triangular, spreading, stiff, green, edges red. *Corolla* lemon-yellow, pendulous; tube 1 in. long, funnel-shaped, base narrowed, mouth dilate, .5 in. across; upper lobes broad, rounded, recurved. lower ones larger. *Stamens* 2; filaments short, sinuate, pubescent; anthers subtriangular. *Ovary* and style .5 in. long, pubescent; stigma peltate. *Disk* cylindric. *Capsule* 1 in. long, angled, glabrous. Journ. Str. Br. R. As. Soc. No. 43, 32.

KEDAH; Gunong Jerih, at 2000 ft. alt., *Ridley* 5518.

4. *DIDYMOCARPUS PURPUREA*, *Ridley* in Journ. Linn. Soc. XXXII. 508 (1895). *Stem* herbaceous, 12 to 18 in. high. *Leaves* ovate, acute, inaequilateral, velvety; 4 in. long, 2 in. broad; margins crenulate; petiole .25 to .5 in. long. *Panicle* erect, subterminal, 4 in. long, with slender branches; peduncle 3 in. long, glabrous; bracts small, ovate. *Calyx*-lobes spreading, oblong, glabrous, short. *Corolla* tubular, purple; tube narrowed at base; lobes rounded, lower ones longer. *Stamens* 2; filaments filiform, included; staminodes filiform. *Ovary* cylindric; stigma broad, discoid. *Capsule* .5 in. long, cylindric, glabrous, stipitate. Journ. Str. Br. R. As. Soc. No. 43, 33.

KEDAH: Lankawi Island on Gunong Chinchau, 1000 to 1500 ft., *Curtis* 2567.

Sect. II. DIDYMANTHUS.

5. *DIDYMOCARPUS PARVIFLORA*, *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 33 (1905). A small erect herb about 1 ft. high or less, much branched; stem slender, covered with appressed hairs. *Leaves* opposite, equal; lanceolate, acute; 1 in. long, .25 in. broad; glabrous and punctulate on the upper surface, on the lower yellow pustular and
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with short translucent hairs which are longer and multicellular along the margin, midrib and nerves; nerves 5 pairs; petiole .25 in. long, hairy. *Flowers* solitary, axillary on slender hairy peduncles .25 in. long. *Calyx*-lobes linear, obtuse, pubescent. *Corolla* .25 in. long, yellow-pubescent; tube broad, straight; lobes short, broad, rounded. *Stamens* nearly as long as corolla-lobes; anthers large, white, reniform; filaments glabrous. *Ovary* as long as stamens, pubescent; stigma capitate, entire. *Capsule* slender, pubescent.

NEGRI SEMBILAN: at Gunung Angsi, *Ridley*.

6. *DIDYMOCARPUS FLAVA*, *Ridley* in Journ. Linn. Soc. XXXII. 507 (1895). *Stem* 1 ft. tall, scabrid, branched. *Leaves* lanceolate acute, base narrowed; denticulate on the margins; scabrid beneath, covered on the nerves with short hairs; 3 in. long, 1.5 in. broad; petiole .5 in. long. *Cymes* axillary and subterminal, on hairy peduncles 1 to 2 in. long; pedicels .5 in. long; flowers 4 or 5. *Calyx* short; lobes hispid lanceolate. *Corolla* glabrescent, yellow, .75 in. long; tube straight, dilated upwards; lobes short, obtuse. *Style* slender, pubescent. *Capsule* cylindric, 1.5 in. long, hispid. *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 34.

PERAK: Larut Hills, *Ridley* 2914; *Curtis* 2690; at 2500 to 3000 ft., *King's Collector* 2151; *Scortechini* 563.

VAR. purpurascens, *Ridley*. *Stems* stouter, over 1 ft. high, hairy. *Leaves* opposite, equal, obliquely ovate acute, often purple as is the stem.

PERAK: Bukit Kapayang, Sungei Siput, *Ridley*.

7. *DIDYMOCARPUS RAMOSA*, *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 34 (1905). *Stem* slender, branched, pubescent with appressed hairs, over 1 ft. tall. *Leaves* distant, opposite, but one of each pair much smaller; ovate acuminate, thin, rounded or slightly narrowed at the base; glabrous above, sparingly hairy on the nerves beneath; nerves about 7 pairs; 2 to 3 in. long, 1.5 in. wide or smaller; petiole .125 in. long. *Peduncles* slender, from the lower axils, 1.25 in. long, 2-flowered, viscid hairy. *Calyx*-lobes lanceolate acuminate, viscid hairy, .125 in. long. *Corolla*-tube straight, hardly dilated, .5 in. long, greenish yellow, bilabiate; lower lobe longer than upper; lobes rounded. *Stamens* 2; filaments long filiform; anthers oblong. *Ovary* long-cylindric; style long, slender; stigma capitate, small.

PERAK: Gunung Batu Putih, *Wray* 868.

8. *DIDYMOCARPUS FLAVESCENS*, *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 35 (1905). *Stems* slender, over 1 ft. long, covered with short appressed hairs. *Leaves* distant, opposite but unequal; lanceolate, acuminate at both ends, entire; sprinkled over on both surfaces with

short scattered hairs; 1.5 to 2 in. long, .5 in. wide; petiole .15 to .2 in. long, silky-hairy. *Peduncles* 1-flowered, slender, subterminal, 1 in. long, pubescent. *Calyx*-lobes linear, hairy. *Corolla* yellowish-white, .5 in. long, pubescent; tube straight, cylindric, hardly dilated above; bilabiate; lobes short, rounded. *Stamens* 2; filaments filiform. *Ovary* short, cylindric; style short, pubescent; stigma capitate.

SELANGOR: Kwala Kubu, *Ridley* 7585.

9. *DIDYMOCARPUS HISPIDA*, *Ridley* in *Journ. Linn. Soc.* XXXII. 507. (1895). *Stem* 6 to 12 in. tall, hispid. *Leaves* opposite, equal; ovate or lanceolate, acute or acuminate at both ends; 3 to 5 in. long, 1 to 2 in. wide; scabrid on the upper surface, hairy on the lower, especially on the nerves; petiole 1 in. long. *Peduncles* 1 to 3, erect from the upper axils, 3 in. long, hairy, with 3 or 4 terminal branches, bearing a few flowers; pedicels hispid, .5 in. long; bracts linear, .25 in. long. *Calyx* .25 in. long; lobes lanceolate, hairy. *Corolla* glabrous, 1 in. long, white with violet streaks in the lower lip; tube straight, funnel-shaped; upper lobes ovate subacute, lower ones longer. *Stamens* 2; filaments slender, nearly straight, filiform; staminodes short, clubbed, 2. *Ovary* fusiform, pubescent; style terete; stigma capitate. *Capsule* 1.5 in. long, straight, cylindric. *D. hispidula*, *Ridley* in *Journ. Str. Br. R. As. Soc.* No. 43, 35.

PERAK: Larut Hills at 4000 to 6000 ft., *Curtis* 1312, 2037; *Ridley*; *King's Collector*; *Scortechini* 467?

VAR. ? *selangorensis*, *Ridley*. *Leaves* shorter, glabrous above. *Calyx*-lobes longer. *Capsule* 3 in. long, softly velvety.

SELANGOR: Gumong Semangko, *Curtis* 3752.

10. *DIDYMOCARPUS HIRTA*, *Ridley* in *Journ. Str. Br. R. As. Soc.* No. 43, 36 (1905). *Stem* herbaceous, branched, about 1 ft. tall, thickly covered with rather long reddish multicellular hairs. *Leaves* opposite; ovate or ovate-lanceolate, subacute, narrowed at the base; 3 in. long, 1 to 1.5 in. wide; margin serrulate, hairy; rather densely hairy on the upper surface with multicellular hairs; on the lower surface, midrib, and nerves covered with close long pale hairs; petiole .25 in. long, hairy. *Peduncles* subterminal, 2.5 in. long, very hairy, red; bract very small, linear; flowers solitary on the peduncles. *Calyx*-lobes linear, narrow, hairy, .15 to .2 in. long. *Corolla* absent. *Capsule* 2 in. long, cylindric, closely but very shortly hairy. *Ovary* cylindric; style long, pubescent; stigma discoid.

SELANGOR: above the gap, Semangko Pass, *Curtis*.

11. *DIDYMOCARPUS VISCIDA*, *Ridley* in *Journ. Str. Br. R. As. Soc.* No. 43, 36 (1905). *Stems* slender, 6 in. long or more; shortly roughly hairy. *Leaves* opposite, thin; lanceolate or ovate-lanceolate, acuminate; base inæquilateral; upper surface sparingly scabrid hairy, lower hairy on

the nerves; 3 to 4 in. long, 1 to 1.5 in. broad; main nerves about 6 pairs; petiole .5 in. long, roughly hairy. *Peduncle* subterminal, 2 in. long, viscid hairy; cyme-branches 1 in. long. *Calyx*-lobes very short, lanceolate, viscid hairy. *Corolla* rather over .5 in. long; tube swollen at base, then funnel-shaped, white, sparingly pubescent. *Stamens* 2, included; filaments filiform. *Style* shorter than stamens. *Capsule* slender, cylindric, acuminate, viscid hairy, 1 in. long.

PERAK: Gunong Keledang, *Ridley* 9781.

12. DIDYMOCARPUS ALBINA, *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 37 (1905). *Stem* 2 to 3 ft. tall, herbaceous, appressed hairy. *Leaves* opposite, equal; lanceolate or ovate-lanceolate, acuminate at base and apex; margins shortly serrate; 4 to 6 in. long by 1.5 to 2 in. wide; glabrous except the midrib on the back, which is covered with appressed hairs; petiole appressed hairy, 1.5 in. long. *Peduncle* axillary, 3 in. long, with a lax few-branched terminal panicle 1 in. long; bracts and bracteoles linear. *Calyx*-lobes lanceolate acuminate, .1 in. long. *Corolla* .5 in. long, waxy white, slightly pubescent; tube cylindric; limb distinctly bilobed. *Stamens* 2; filaments glabrous; anthers ovate-lanceolate. *Ovary* and style pubescent.

PERAK: Gunong Batu Putih, at 3000 to 4000 ft., *King's Collector* 8070.

This is allied to *D. hispida*, *Ridl.*, but with nearly glabrous and more lanceolate leaves and smaller flowers.

13. DIDYMOCARPUS ALTERNANS, *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 37 (1905). *Stem* about 1 ft. tall, erect, scabrid hairy above, rather slender. *Leaves* thin; subalternate or opposite; lanceolate acuminate; base inaequilateral cuneate; entire or slightly serrate; 3 in. long by 1.25 in. wide; nearly glabrous except the midrib on the back and petiole, .25 in. long, which are scabrid hairy; opposite leaf reduced to a small ovate blade .5 in. long or wanting. *Flowers* solitary, axillary on short pedicels, slender, .125 to .25 in. long with 2 linear small bracts, all pubescent. *Calyx*-lobes lanceolate acute, hairy, .125 in. long. *Corolla* .5 in. long, white, centre yellow; tube narrowed at the base, dilated upwards, pubescent; lobes subequal, rounded; lips not very distinct. *Stamens* 2; filaments filiform, included; anthers elliptic, connate; staminodes filiform, short, clubbed. *Style* fairly long, hairy; stigma capitate. *Capsule* slender, cylindric, glabrous, 1 in. long.

PERAK: at Bujong Malacca, *Ridley* 9777; *Curtis* 3133; Larut Hills, 500 to 1500 ft., *King's Collector* 2311. On banks up to 4000 ft.

14. DIDYMOCARPUS GLABRATA, *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 38 (1905). A slender branched herb over 1 ft. high, almost

glabrous except for a little pubescence on the stem and petioles. *Leaves* opposite, subequal or one leaf larger than the other; elliptic or ovate, apex subacute, base cuneate or rounded and oblique; margins entire; 1.5 to 3 in. long, 1 in. broad or less; main nerves 7 pair, with midrib pubescent; petiole slender, pubescent, .25 in. long or less. *Peduncles* from the upper axils 2-flowered, axillary, 2 in. long, pubescent; bracts very small, linear; pedicels .25 in. long, pubescent. *Calyx*-lobes narrowly lanceolate, .125 in. long. *Corolla* white (not seen). *Capsule* linear, acuminate, 1.5 in. long, pubescent.

JOHORE: at Gunong Panti, *King's Collector* 209.

15. DIDYMOCARPUS MALAYANA, Hook. f. in Gard. Chron. II. 123, fig. 24 (1896). *Stem* very short, up to 3 in. long. *Leaves* ovate obtuse shortly petioled to lanceolate acute, long-petioled; 7 in. long, 2.75 in. broad; main nerves 15 pairs, conspicuous, silky-hairy. *Peduncles* stout, silky-hairy, 3 to 4 in. long, scapose with 2 flowers at the top or with 2 erect branches 3 in. long bearing 8 or 9 flowers each; flowers nodding. *Calyx*-lobes linear, obtuse, pubescent, long. *Corolla* 2 in. long, bright yellow; tube narrowed at the base, gibbous, inflated above, hairy; lobes rounded, subequal. *Stamens* 2; filaments included, curved, glabrous; anthers shield-shaped with 2 projecting horns on each; staminodes minute, tooth-like. *Ovary* conic, hairy; style long, glandular-pubescent; stigma capitate. *Disk* cylindric. *Capsule* cylindric, 1 to 1.5 in. long. Bot. Mag. t. 7526; Ridley in Journ. Str. Br. R. As. Soc. No. 43, 38.

PERAK: Bujong Malacca, *Curtis* 3300, *Ridley* 9778; Tanjong Malim, *Baldwin*; Chabong, *Scortechini* 189; Ulu Bubong and Ulu Kirling, *King's Collector* 8799?, 10197? SELANGOR: Gunong Semangko, *Curtis* 3300; Bukit Kutu, *Ridley* 7580; Ginting Bidai, *Ridley* 7581. Usually at 1500 to 3000 ft. alt.

16. DIDYMOCARPUS ALBOMARGINATA, Hemsley in Journ. Bot. XXV. 204 (1887). *Stem* 6 to 12 in. tall, pubescent, red. *Leaves* elliptic or ovate, obtuse, with a broad or cuneate base, dark green; edges and nerves white, sparsely hairy above, silky beneath; nerves about 10 pairs; 3 to 4 in. long, 1 to 1.5 in. wide. *Peduncles* axillary and subterminal, hairy, pink, 3 in. long, racemose or sparingly branched. *Calyx*-lobes lanceolate, hairy. *Corolla* yellow; tube narrow, pinkish white, dilated upwards; lobes subequal, rounded. *Stamens* 2; filaments thickened at the base, curved; anthers reniform with short processes; staminodes 2, filiform, hooked. *Ovary* cylindric, conic, pubescent; style long; stigma wide, discoid. *Capsule* cylindric, acuminate, rather thick; tip upcurved, hairy, .75 in. long. Ridley in Journ. Linn. Soc. XXXII. 506, and in Journ. Str. Br. R. As. Soc. No. 43, 39.

PERAK: Larút Hills, 3000 to 5000 ft., Wray; Curtis 2039, 2991; Ridley 2908; King's Collector 1817.

A species closely allied to *D. malayana*, and difficult to distinguish from it in dried specimens except from the much smaller flowers.

17. *DIDYMOCARPUS FLAVOBRUNNEA*, Ridley in Trans. Linn. Soc. Ser. 2, III. 329 (1893). *Stem* slender, seldom branched, densely pubescent, 3 to 4 in. tall. *Leaves* alternate; ovate lanceolate, acute; base unequal narrowed; margins serrate; 7 in. long, 3 in. wide; nerves and midrib beneath covered with shining brown hairs, above sparingly pubescent. *Peduncles* 8 in. long, stiff, hispid, branched shortly dichotomously above; branches short, crowded; flowers numerous, small; bracts lanceolate, acuminate, .25 in. long, hispid; pedicels short. *Calyx*-lobes linear, narrow, pubescent. *Corolla* 1 in. long; tube cylindric, gradually dilated towards the lips; lobes unequal, rounded, short; tube brownish outside; limb yellow with an orange spot in the mouth and some red streaks. *Stamens* 2, with filiform filaments. *Ovary* elliptic. *Capsule* 1 in. long, narrowed gradually from the base, splitting above nearly to the apex, glabrous. Journ. Str. Br. R. As. Soc. No. 43, 39.

PAHANG: Tahan River woods, Ridley 2163.

The fruits crowded at the top of the peduncle radiating in all directions give this species the appearance of a *Parabæa*.

18. *DIDYMOCARPUS LONGIPES*, Clarke in DC. Monog. Phan. V. i. 86 (1883). *Stem* woody, 2 in. long, hairy at the top. *Leaves* oblanceolate, narrowed to the base; obscurely serrate; glabrous and deep green above, hairy on the midrib and purple beneath; 8 in. long, 2.25 in. broad. *Flowers* few, racemose (occasionally paniced), pendent on peduncles 9 to 18 in. long, rather stout, purple. *Calyx*-lobes linear, acuminate, pubescent, purple, .125 in. long. *Corolla* 1.5 in. long, pale yellow, pubescent; tube straight, little dilated upwards; upper two lobes short, rounded; lower longer, oblong. *Stamens* 2; filaments short, thick, adnate to the tube near the mouth; anthers reniform, connate, just included, with 2 short appressed horn-like processes to the connective. *Ovary* elongate, conic, passing into the terete style; stigma discoid. *Disk* cylindric. *Capsule* 1.25 in. long, rather thick, splitting along the upper edge. Clarke in Hook. f. Fl. Br. Ind. IV. 351; Ridley in Journ. Linn. Soc. XXXII. 509, and in Journ. Str. Br. R. As. Soc. No. 43, 40.

MALACCA: Mount Ophir, Griffith (K.D.) 3854; Cuming 2385; Main-gay (K.D.) 2723; Ridley 3179.

19. *DIDYMOCARPUS INÆQUALIS*, Ridley in Journ. Linn. Soc. XXXII. 506 (1883). *Stem* woody, 5 in. or more tall, .125 in. thick, brown-

pubescent. *Leaves* alternate, distant, lanceolate, inæquilateral, acute, serrate, narrowed to the base; velvety above, pubescent beneath; 5 in. long, 1·5 in. wide or smaller; petiole distinct, pubescent, ·5 in. long. *Peduncles* from the upper axils 1·5 in. long, pubescent; flowers crowded, pedicellate; bract linear, nearly ·25 in. long. *Calyx* campanulate; lobes not free to the base, linear, ·125 in. long, pubescent. *Corolla* blue, 1 in. long; tube slender, enlarged upwards; lobes short, rounded; filaments long slender. *Ovary* elongate cylindric; stigma obconic. *Capsule* cylindric, glabrous, 1·5 in. long. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 41.

KEDAH: on Lankawi Island at Gunong Chinchang, *Curtis* 2568.

20. DIDYMOCARPUS ALBA, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 41 (1905). *Stem* woody, creeping, ascending, hairy-pubescent. *Leaves* crowded towards the top; lanceolate, acute at base; 2 in. long, ·25 to ·5 in. wide, softly densely hairy on both sides; petiole densely hairy, ·5 in. long. *Peduncles* short, ·5 in. or less long, 1-flowered, densely hairy. *Calyx*-lobes free to base, linear, acuminate, long-hairy, ·125 in. long. *Corolla* quite white, ·5 in. long, base cylindric, gradually dilated upwards, hairy; lobes short, rounded, subequal. *Stamens* 2; filaments rather short, filiform; staminodes 3, filiform, clubbed, shorter. *Ovary* pubescent. *Capsule* ·75 in. long, curved, acuminate, splitting along the upper surface, glabrous.

PERAK: at Bujong Malacca, *Curtis* 3299; *Ridley* 9780; *Scortechini*.

VAR. *major*, Ridley. *Stems* taller, over 1 ft. high. *Leaves* more remote and less hairy. *Peduncles* longer, 1 in. in flower, 1·25 in. in fruit. *Corolla* 1 in. long.

PERAK: at Gunong Bubu, 4500 ft., *Wray* 3209.

Sect. III. REPTANTES.

21. DIDYMOCARPUS REPTANS, Jack in Mal. Misc. I. pt. ii. 3 (1820), and in Trans. Linn. Soc. XIV. 35. *Stems* creeping, 6 in. or more long, villous. *Leaves* opposite; ovate or elliptic, blunt at apex, narrowed or rounded at base; upper surface sprinkled with villous hairs, lower more hairy; margins obscurely crenulate; ·75 to 3 in. long, ·5 to ·75 in. broad. *Peduncles* slender, subterminal, 1-flowered, hairy, 1 in. long; bract very small; pedicel ·25 in. long. *Calyx*-lobes linear, villous, ·125 in. long. *Corolla* ·5 in. long, pubescent, white with purple and yellow streaks in the mouth; tube trumpet-shaped; lobes rather large, rounded. *Stamens* 2; filaments far included, filiform; staminodes very short. *Ovary* cylindric; style slender; stigma discoid. *Capsule* 1 in. long, slender, scabrid, splitting nearly to the apex. Calc. Journ. Nat. Hist. IV. 55; Spreng.

Syst. II. 837; Wall. Cat. 787; G. Don Gen. Syst. Dichl. Pl. IV. 659; R. Br. in Benn. Pl. Jav. Rar. 119, and Am. Sc. Nat. 2, XIII. 164; DC. Prodr. IX. 286; Miq. Fl. Ind. Bat. II. 726; Clarke in DC. Monog. Phan. V. i. 95, and in Hook. f. Fl. Br. Ind. IV. 352; Ridley in Journ. Linn. Soc. XXXII. 511, and in Journ. Str. Br. R. As. Soc. No. 43, 42. *Henckelia reptans*, Spreng. Syst. curae post. 14.

PENANG: Wallich 787; Maingay (K.D.) 1223; Lobb 335; at Pulau Betong, Curtis 1706; Penang Hill, G. King. SELANGOR: Bukit Kutu, Ridley 7585.

VAR. *monticola*, Ridley. More slender, and creeping for 1.5 ft. or more; the shoots covered with rufous hairs. Leaves narrower, lanceolate, acute, narrowed into the petiole; 2 to 3 in. long, .3 to .5 in. broad. *D. ? producta*, Clarke in DC. Monog. Phan. V. i. 96.

PERAK: Gunong Batu Putih, Wray 480, 927; Larut Hills Curtis 2040, 2992; Ridley 2912; Scortechini 20, 257; Goping, King's Collector 1099. DINDINGS: Simpiti, near Lumut, Ridley 3062. SELANGOR: Pahang track, Ridley 8561; Ginting Bidai, Ridley 7586. NEGRI SEMBILAN: Bukit Tamiang and Bukit Sulu, Cantley's Collector.—DISTRIB. Sumatra (*Horsfield*).

VAR. *violascens*, Ridley. Stems ascending for 1 ft. or so. Leaves rather remote, nearly glabrous above except for dense hair on the margins and midrib, more hairy beneath; nerves elevated, densely appressed-hairy. Flowers purplish-white.

SELANGOR: Rawang, Ridley 7583; Dusun Tera, Ridley 7584.

22. *DIDYMOCARPUS OPHIRENSIS*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 43 (1905). Stem creeping, over 1 ft. long. Leaves opposite, somewhat unequal, elliptic; dark green with white on the nerves, 1 to 3 in. long, .5 to 1 in. wide, base rounded; above sprinkled with short hairs, beneath paler, more hairy; margins entire, thickly hairy; nerves 5 to 6 pairs, densely hairy; petiole .25 in. long, hairy. Peduncles subterminal, 1 in. long, hairy. Calyx-lobes linear, .125 in. long, densely hairy. Corolla .75 in. long, gradually dilated forwards, rather broad at the top, hairy, purple and white; upper lip much shorter than lower one. Stamens filiform, little shorter than the corolla. Style slender; stigma capitate. Capsule cylindric, hairy, 1 in. long.

MALACCA: lower part of Mount Ophir, Ridley 3185.

Ridley says: "I took this at first to be *D. marginata*, Clarke in DC. Monog. Phan. V. i. 96, and in Hook. f. Fl. Br. Ind. IV. 352, which was based on a plant collected in Malacca or Luzon by Lobb, but which, from the description, may be a form of *D. reptans*, and the locality of which is doubtful."

23. *DIDYMOCARPUS PULCHELLA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 44 (1905). Stems slender, 3 to 6 in. long, purple, covered with

appressed hairs. *Leaves* opposite, elliptic, obtuse, 1 to 2 in. long; dark green above with a central white stripe, dotted with short hairs; beneath purple, sprinkled with hairs; the nerves and edges hairy; petiole .25 to .5 in. long, hairy. *Peduncles* axillary, 1 in. long, slender, hairy; bract linear, very small; pedicel .5 in. long, slender, hairy. *Calyx*-lobes narrowed, linear, .125 in. long, hairy. *Corolla* white, with yellow in the mouth, nearly 1 in. long; tube cylindric, hardly dilated, sparingly hairy; lobes oblong, rounded. *Stamens* 2 fertile; filaments filiform, straight; anthers oblong. *Ovary* slender, cylindric, pubescent, with style .4 in. long. *Capsule* narrow, cylindric, upcurved, 1.5 in. long, pubescent.

PAHANG: Kwala Lipis, *Machado* 11629.

24. *DIDYMOCARPUS CROCEA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 44 (1905). *Stems* succulent, creeping, pubescent, 1 ft. or more long. *Leaves* opposite but unequal; ovate, obtuse; surfaces softly hairy, green with white veins; 1 to 3 in. long, .75 to 1.25 in. broad; nerves raised beneath; petiole .5 in. long or less. *Peduncles* subterminal, 1 to 3 in. long, 1-flowered, softly hairy; bracts 2, short, linear. *Calyx*-lobes linear, pubescent, .15 to .2 in. long. *Corolla* orange-yellow, pubescent, bilabiate, 2 in. long; tube narrowed at the base, dilated, gibbous above; lobes rounded, darker orange; lower lip longer than upper. *Stamens* 2; filaments sinuate; anthers with 2 processes each on the back; staminodes filiform, hooked. *Style* slender; stigma capitate. *Capsule* rather thick, curved upwards, 1.25 in. long, pubescent.

PERAK: Gunong Keledang, on banks, *Ridley* 9776; *Curtis* 3301; Sungkei, *King's Collector* 3014.

25. *DIDYMOCARPUS ASCENDENS*, Ridley in Journ. Linn. Soc. XXXII. 512 (1896). *Stem* rather slender, creeping, ascending, branched above, 4 to 8 in. high; branches 2 in. long or more. *Leaves* crowded above, opposite, subequal; ovate, subacute, narrowed or broad at base, entire; surface dark green, silky-hairy, the edges white-silky; 1.5 to 2 in. long, .5 to 1 in. broad; petiole 1 in. long or less. *Flowers* solitary on hairy peduncles .5 to 1 in. long. *Calyx*-lobes linear, acuminate, silky. *Corolla* orange-yellow, 1.5 in. long, narrow cylindric, dilated above, pubescent; lobes short, rounded, subequal. *Stamens* 2; filaments long, thick; anthers triangular, obtuse. *Ovary* cylindric, pubescent; style long; stigma ovate, triangular. *Capsule* cylindric, acuminate, 1 in. long. *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 45.

PERAK: Tapa, *Haviland*; *Curtis* 3106; Goping, *King's Collector* 458.

Sect. IV. HETEROBÆA.

26. *DIDYMOCARPUS RUGOSA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 966

45 (1905). *Stem* short, stout, woody, 2 to 3 in. long. *Leaves* crowded at the top, rather thick; oblong, oblanceolate, winged to the base; dentate; glabrous and strongly bullate, wrinkled above, beneath pubescent with midrib and nerves hairy; nerves very numerous and close (about 40 pairs), nervules transverse, strongly raised; 3 to 5 in. long, 1.5 to 2 in. wide. *Peduncles* slender, 3 in. long, hairy, ebracteate; flowers solitary. *Calyx*-lobes short, ovate acute. *Corolla*-tube trumpet-shaped, 1 in. long; lower lip longer than the upper; lobes broad, white with yellow central bar. *Stamens* 2; anthers narrow; connective 2-horned; staminodes short, very slender, hooked. *Ovary* and style very hairy; stigma broad, reniform.

PERAK: Hulu Selama, *Scortechini* 1273. KELANTAN: Kwala Lebir, *Dr. Gimlette*.

27. *DIDYMOCARPUS PLATYPUS*, Clarke in DC. Monog. Phan. V. i. 94 (1883), and in Hook. f. Fl. Br. Ind. IV. 352 (1884). *Stem* woody below, pubescent, leafy above, 4 to 22 in. long. *Leaves* sessile, alternate; oblanceolate, 8 to 13 in. long, 3 in. wide; margins serrate; above sprinkled with multicellular hairs from a swollen base, beneath glabrous except for the elevated nerves and reticulations, densely appressed hairy. *Peduncles* numerous, axillary, 1 in. long, slender, hairy; bracts 2, short, lanceolate, hairy; pedicel 1-flowered, .5 in. long, hairy. *Calyx*-lobes ovate, obtuse, hairy, .1 in. long. *Corolla* from a narrow base dilated forwards, 1.25 in. long, sparingly hairy, white with a yellow mouth; lobes broad, rounded. *Stamens* 2; filaments filiform, long; anthers reniform, with a process of the connective projecting beyond them. *Style* long, slender; stigma wide, discoid. *Capsule* cylindric, 1.5 in. long, pubescent. Ridley in Journ. Linn. Soc. XXXII. 505, and in Journ. Str. Br. R. As. Soc. No. 43, 46.

PERAK: Gunong Batu Putih, *Wray* 934; Goping, *King's Collector* 832. SELANGOR: Klang, *Beccari* 5; Kuala Lumpur, *Ridley*. NEGRI SEMBILAN: Perhentian Tinggi, *Ridley* 10097; Bukit Temiang, *Cantley*. MALACCA: *Griffith* (K.D.) 3825; *Maingay* (K.D.) 1226; *Cuming* 2359; Ayer Panas, *Derry* 111; *Harvey*. JOHORE: Ulu Batu Pahat, *Kelsall*; Gunong Pulai, *Ridley* 3729. SINGAPORE: Bukit Timah, *Selitar*, *Ridley*.—DISTRIB. Sumatra.

28. *DIDYMOCARPUS KOMPSOBCEA*, Clarke in DC. Monog. Phan. V. i. 92, t. 10 (1883). *Stem* woody, 4 to 5 in. tall. *Leaves* crowded at the top; oblanceolate, acute, narrowed towards the base; 5 to 9 in. long, 2 to 3 in. wide; margins coarsely crenate-dentate; above glabrous when adult, with a few multicellular hairs when young; beneath minutely pubescent; nerves and reticulations elevated; midrib and main nerves with long brownish appressed hairs. *Peduncles* 1-flowered, 4 in. long,

hairy. *Calyx*-lobes ovate, hairy, .125 in. long. *Corolla* white with yellow in the throat; tube 1 in. long; base narrowed, above somewhat abruptly swollen, nearly glabrous; lower lip longer than the upper one. *Stamens* 2; filaments filiform; anthers oblong. *Capsule* 1.75 in. long, moderately thick, pubescent. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 44.

PAHANG: Tahan River Woods, *Ridley* 2152. SELANGOR: Bukit Hitam, *Kelsall*.

29. DIDYMOCARPUS QUINQUEVULNERA, *Ridley* in Trans. Linn. Soc. Ser. 2, III. 328 (1893). *Stem* woody, 6 to 9 in. tall or less, covered with brown wool. *Leaves* lanceolate, acuminate, acute, serrate, narrowed to the base; silky pubescent, dark green; 6 in. long, 2 to 2.5 in. wide. *Peduncles* slender, rosy, white-ciliate; flowers numerous. *Calyx*-lobes lanceolate, acute. *Corolla*-tube slender, dilated forwards, 3 in. long, white, 2-lipped; lobes rounded, crimson or violet-purple edged with white, with yellow streaks in the throat. *Stamens* rather thick, sinuate, white; anthers reniform. *Ovary* cylindric, pubescent; stigma cordate. *Capsule* cylindric, acuminate, 3.5 in. long. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 47.

PAHANG: Kota Glanggi, Tahan Woods, *Ridley* 2144, 2154. SELANGOR: Pahang Track, 15th mile, *Ridley* 8559.

30. DIDYMOCARPUS ATROSANGUINEA, *Ridley* in Trans. Linn. Soc. Ser. 2, III. 328 (1893). *Stem* woody, 6 in. high, .25 in. thick. *Leaves* lanceolate, acute, crenulate, denticulate or dentate, base broad; 9 in. long, 4 in. wide; deep green velvety pubescent above, glaucescent, pubescent beneath with elevated nerves and nervules. *Peduncles* 3 in. long, pubescent; bracts ovate. *Calyx*-lobes linear, acute, .25 in. long, pubescent, red. *Corolla* pubescent, deep red, yellow in the mouth; tube 2 in. long, dilated upwards; lobes subequal, ovate obtuse. *Stamens* 2; filaments sinuous, rather thick; anthers semi-ovate. *Style* longer than the stamens, pubescent; stigma rounded. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 47.

PAHANG: Tahan Woods, *Ridley*. TRINGGANU: *Ridley*.

31. DIDYMOCARPUS HIRSUTA, *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 48 (1905). *Stem* woody, over 1 ft. long, branched, densely hairy above with long multicellular hairs. *Leaves* alternate, lanceolate acuminate, narrowed to the base, crenate, densely hairy on both surfaces; 6 in. long, 1.5 in. wide; petiole .5 in. long or less. *Flowers* solitary on the peduncles in the lower and upper axils. *Peduncles* very slender, hairy, 1 in. long. *Calyx*-lobes short, ovate lanceolate, obtuse. *Corolla* narrow, 1.5 in. long, yellow, pubescent. *Capsule* very narrow, cylindric, pubescent, 3 in. long.

PERAK: Goping, *King's Collector* 715; Larut Hills, *King's Collector* 2529.

32. *DIDYMOCARPUS BOMBYCINA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 32 (1905). *Stem* branched, woody, 3 to 4 ft. tall; above closely silky pubescent. *Leaves* lanceolate acuminate; 4 to 6 in. long, 1 in. across; narrowed to the base; minutely crenulate; densely silky pubescent on both sides; nerves very numerous and close. *Pedicels* short, 1 in. long, slender, silky. *Calyx*-lobes ovate, acute, small, silky. *Corolla*-tube 1 in. long, sparingly pubescent, white tinged with pink or blue, trumpet-shaped.

PERAK: Ulu Bubong, 400 to 600 ft., *King's Collector* 10587.

33. *DIDYMOCARPUS CRINITA*, Jack in Mal. Misc. I. II. 1 (1820), and in Trans. Linn. Soc. XIV. 33, t. 2, fig. 2 (1823). *Stem* woody, pubescent, 6 in. tall. *Leaves* narrow, lanceolate acute, narrowed to the base; shortly and closely serrate; 6 in. long, 1 in. wide; dark green above, sometimes with a white longitudinal bar, covered closely with short velvety hair; beneath purple with longer hair especially on the nerves. *Peduncles* about 1 in. long, villous; *pedicels* .25 in. long; bracts linear, all villous. *Calyx*-lobes narrow, lanceolate acute, villous, .125 in. long. *Corolla* white or usually pale blue, 1.5 in. long, pubescent; tube narrowed at the base, dilated forwards; lobes large, rounded, subequal. *Stamens*: filaments filiform, curved; anthers oblong with short lateral processes. *Style* and *ovary* cylindric, pubescent; stigma discoid. *Capsule* slender, cylindric, 2 to 3 in. long, pubescent. Calc. Journ. Nat. Hist. IV. 53, t. 15, fig. 2; Wall. Cat. 779; Spreng. Syst. II. 837; G. Don Gen. Syst. Dichl. Pl. IV. 659; R. Br. in Benn. Pl. Jav. Rar. 118, and in Ann. Sc. Nat. 2, XIII. 164; DC. Prodr. IX. 265; Hook. Bot. Mag. t. 4554; Fl. des Serres, t. 631; Lem. Jard. Fl. t. 87; Miq. Fl. Ind. Bat. II. 724; Clarke in DC. Monog. Phan. V. i. 93, and in Hook. f. Fl. Br. Ind. IV. 351; Ridley in Journ. Linn. Soc. XXXII. 505, and in Journ. Str. Br. R. As. Soc. No. 43, 49. *Henckelia crinita*, Spreng. Syst. curæ post. 13.

KEDAH: Gunong Jerai, *Ridley*; Tomoh, *Machado*. KELANTAN: Kwala Lebir, *Dr. Gimlette*. PENANG: *Wallich*; *Helper* 3834; *Gaudichaud* 71; West Hill, *Curtis* 410; *Stoliczka*; *G. King*; *Deschamps*. PERAK: Larut Hills, *Scortechini* 10294; *Ridley* 2907; *King's Collector* 2157; Tapa, *Curtis* 3781. SELANGOR: Ginting Bidai, *Ridley* 7577. SUNGAI UJONG: Bukit Sulu, *Cantley*. PAHANG: Raub Track, *Machado* 11575; Tahan Woods, *Ridley* 2169. MALACCA: *Maingay* (K.D.) 1225; *Harvey*. SINGAPORE: *Walker* 18; *Lobb* 311. — *DISTRIB.* Sumatra, Borneo.

VAR. *Curtisii*, *Ridley*. *Leaves* oblanceolate, acute, serrate, deep green

with a silvery central bar, covered with long multicellular hairs from a swollen base on both sides, very dense and longer on the back at the base and on the buds. *Scapes* 3 in. long, hairy, slender. *Calyx*-lobes oblong, hairy, blunt. *Corolla* 2 in. long, blue; tube hairy, swollen upwards; lobes unequal, 1 in. across the limb. *Stigma* broad, heart-shaped.

SELANGOR: near the Gap, *Curtis*.

VAR. *elongata*, Ridley. *Stem* tall and somewhat branched. *Leaves* scattered, narrow and small; 3 in. long, .5 in. wide, hairy. *Flowers* small, pale blue, 1 in. long, on slender pedicels 3 in. long or less, from the lower as well as from the upper axils.

PERAK: Tapah, *Curtis* 3781.

34. DIDYMOCARPUS FASCIATA, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 50 (1905). *Stem* woody, 6 to 8 in. tall, with soft hair in the upper parts. *Leaves* alternate, narrowly lanceolate, acuminate, narrowed to base; 4 to 8 in. long, 1.5 in. wide; margins serrulate crenulate; above deep velvety malachite green, with a broad central white bar covered with short scattered hairs; back, edges, and petiole with longer pale silky hairs. *Peduncles* slender, short, 1.5 in. long, hairy; bract very small, linear. *Calyx*-lobes narrow, lanceolate, very small. *Corolla* 1.5 in. long, cylindric, trumpet-shaped; white limb edged violet. *Capsule* very slender, 2 in. long or less, glabrous.

KEDAH: Gunong Jerai, *Ridley*. PAHANG: Tahan River, in rocky woods, *Ridley* 2169.—DISTRIB. Lingga, Batu Gajah (*Hullett*).

35. DIDYMOCARPUS VENUSTA, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 51 (1905). *Stem* erect, woody, 12 to 18 in. tall. *Leaves* oblong lanceolate, subacute, crenulate-serrate, narrowed into the petiole, winged to the base; 4 to 6 in. long, 1 to 2 in. wide; nerves elevated on both surfaces, 22 pairs; glabrous above, nerves and midrib ferruginous hairy beneath. *Peduncles* axillary, 1 or 2 in. in an axil, 7 in. long, hairy; flowers terminal, 2, large, white; bracts 2, oblong cuspidate, glabrous, .3 to .4 in. long; pedicels hairy, lower one .25, upper one .5 in. long. *Calyx*-lobes free to base, linear acuminate, pubescent, .5 in. long. *Corolla* pubescent; tube enlarged upwards, infundibuliform, 1.5 in. long, pure white with a brown spot on the lower lobes; upper lobes shorter than lower, rounded; lower lip .5 in. long, lobes oblong. *Stamens* included, 2; filaments filiform; anthers oblong; staminodes filiform, hooked. *Ovary* narrow, cylindric, with style .5 in. long; all pubescent; stigma large, cordate. *Capsule* terete, acuminate, splitting along the upper edge, glabrous, 2 to 2.5 in. long.

PERAK: Bujong Malacca, *Ridley*. SELANGOR: Gunong Semangko, *Curtis* 3751.

Ridley says this beautiful plant hardly belongs to this group. It resembles much more closely a *Didissandra*, but has 2 stamens only.

Sect. V. SALICINÆ.

36. *DIDYMOCARPUS DENSIFOLIA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 51 (1905). *Stem* woody, 3 in. tall. *Leaves* numerous, crowded, alternate; lanceolate, acuminate, narrowed to the base, rather thick in texture, entire, nearly glabrous when adult except for a few hairs on the midrib; 1·5 to 5 in. long, ·25 to ·75 in. wide. *Peduncles* hairy, slender, 3 in. long, with a few 1-flowered short branches; bracts linear, oblong. *Calyx*-lobes linear oblong, pubescent. *Corolla* not seen. *Ovary* cylindric, pubescent; style pubescent; stigma small, capitate. *Capsule* cylindric, pubescent, 1 in. long, splitting nearly to the tip.

JOHORE: Gunong Janeng, *Kelsall*.

37. *DIDYMOCARPUS SALICINA*, Ridley in Trans. Linn. Soc. Ser. 2, III. 329 (1893). A small shrubby plant, 3 to 6 in. tall, simple or branched, glabrous below, pubescent above. *Leaves* numerous, crowded above, opposite; narrowly lanceolate, acuminate, glabrous, serrate; 3 to 4 in. long, 1·5 in. wide; pale green above, reddish beneath; petiole slender, 1·5 in. long or less. *Peduncles* numerous, crowded in the upper axils, very slender, glabrous, red, 2 in. long; branches few, divaricate, pubescent; flowers very small, ·125 in. long, pink. *Calyx*-lobes very narrow, linear-pubescent. *Corolla* campanulate; lobes ovate acute. *Stamens* 2; filaments short, slender; anthers reniform. *Style* longer than the corolla, glabrous; stigma small, capitate. *Capsule* cylindric, acuminate, ·75 in. long. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 52.

PAHANG: Tahan River, *Ridley* 2166. On stream-banks in woods.

38. *DIDYMOCARPUS SERRATIFOLIA*, Ridley. *Stem* woody, 6 in. long or less. *Leaves* numerous, lanceolate acute, narrowed at base, not petioled; strongly toothed; teeth ·125 in. long, acute; nerves 40 pairs; 8 in. long, 1 in. wide; glabrous above, midrib with pale hairs beneath. *Scape* slender, hairy, 3 in. long; flowers 4 or 5, nearly sessile. *Calyx*-lobes ovate, short hairy. *Corolla* trumpet-shaped, ·75 in. long, narrowed at base, dilated upwards; lower lip longer than upper one; ·25 in. wide, 3-lobed, side lobes rounded, median longer, oblong; white stained with purple outside, yellow in the mouth. *Capsule* very slender, over 1 in. long, pubescent, pedicelled. *D. serrata*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 52, *not of R. Br.*

PERAK: Larut Hills on rocks in dense forest, below the Tea Gardens, at about 1000 ft. alt., *Ridley* 11922.

39. *DIDYMOCARPUS PECTINATA*, Clarke in Herb. Kew., ex Oliver in Ic. Pl. t. 2246 (1892). Small shrubby plant, 6 in. or more tall, branched or simple. *Leaves* densely crowded at the top, glabrous, deeply pectinate, 6 to 7 in. long; lobes .4 in. long, .125 in. wide at the base, blunt. *Peduncles* from the upper axils several, pubescent, 2 in. long. *Calyx* "dark blue." *Corolla* white, tomentose, .3 in. long; tube cylindric, slightly inflated; upper lobe obovate, rounded. *Stamens* 2; filaments curved; anthers oblong; staminodes absent. *Disk* tubular. *Capsule* .5 to .75 in. long, pale, glabrous, rather thick, curved. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 53.

PERAK: on limestone rocks at 400 to 800 ft. alt., *King's Collector* 10711. SELANGOR: Rawang, *Ridley* 7579; *Kelsall* 1981.

Sect. VI. ACAULES.

40. *DIDYMOCARPUS VIOLACEA*, Ridley in Journ. Linn. Soc. XXXII. 509 (1895). *Rootstock* short, erect; stem 1 in. long, densely woolly. *Leaves* numerous, very unequal, ovate to lanceolate, acute, narrowed at the base, oblique, toothed; densely softly hairy; 2 to 8 in. long, 1.25 to 2.5 in. wide; sessile or petioled; petiole as much as 2 in. long. *Panicles* 2 to 5 in. long, lax; branches slender, pubescent. *Calyx*-lobes oblong, lanceolate, .125 in. long, glabrous. *Corolla*-tube trumpet-shaped, curved, .5 in. long, violet; upper lobes short, recurved, lower ones .25 in. longer. *Stamens* 2; filaments filiform. *Ovary* long, terete; style short; stigma clubbed. *Capsule* glabrous, cylindric, .75 in. long.

PERAK: Hermitage Hill at 5000 ft. elevation, on rocks in the stream, *Ridley* 2909.

41. *DIDYMOCARPUS LACUNOSA*, Hook. f. Bot. Mag. t. 7236 (1892). Stemless. *Leaves* crowded, oblong or ovate, cordate, tomentose, crenulate, 2 to 4 in. long, 1.5 to 3 in. across; above pubescent, beneath rusty tomentose, especially on the elevated nerves; petiole 2 to 4 in. long, rusty tomentose. *Scapes* 4 to 6 in. long, 2- to many-flowered, simple or 3- or 4-branched at the top; branches .5 in. long; flowers nodding. *Corolla* 1 in. long, deep violet blue; tube narrow at the base, gibbous, inflated upwards; lobes short, rounded, subequal. *Stamens* included, curved, swollen near the base, narrowed upwards; anthers elliptic, not horned; staminodes filiform, one-third as long. *Pistil* linear, pubescent, gradually narrowed into the style; stigma very shortly bifid. *Capsule* 2 in. long, linear. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 54.

KEDAH: Lankawi island, at Terutau, on damp rocks, *Curtis* 1655.

42. *DIDYMOCARPUS PERDITA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 54 (1905). *Stem* creeping, woody, about 4 in. long. *Leaves* elliptic obtuse, rounded, peltate; margins crenulate; 3 in. long, 1.5 in. wide; above scabrid and sprinkled over with hairs, beneath glabrous except for the midrib and nerves, which are hairy with appressed hairs; margin with hairs on the crenulations; petiole 1 to 2 in. long, hairy. *Peduncles* slender, 4 in. long, subterminal, hairy. *Calyx*-lobes lanceolate, pubescent. *Corolla* not seen. *Capsule* .5 in. long, narrowed suddenly into the style and only splitting as far as the base of the style; stigma subbilobed, large.

SINGAPORE: Selitar, very rare, Ridley.

Ridley found two plants of this together in a small ravine near Selitar in 1889, one in fruit. Since then the locality has been destroyed by cultivation, and the plant has disappeared and is probably extinct.

43. *DIDYMOCARPUS PUNCTICULATA*, Ridley in Journ. Linn. Soc. XXXII. 510 (1895). Almost stemless. *Leaves* crowded, elliptic or obcuneate or nearly oblanceolate, inæquilateral, base truncate; crenate, puncticulate, hispid; 3 in. long, 1.5 in. wide or smaller; nerves beneath elevated, hairy. *Peduncles* subterminal, 3 in. long, slender, thickening in fruit, hairy. *Calyx*-lobes lanceolate, acute, .06 in. long, hairy. *Corolla* .25 in. long, hairy, violet; tube short, broad campanulate; lower lip longer than the upper one; lobes oblong obtuse. *Stamens* very short; filaments thick; anthers large, conic, shield-shaped; style longer, pubescent. *Capsule* .5 in. long, thick, hispid.

JOHORE: Gunong Panti, Ridley.

44. *DIDYMOCARPUS HETEROPHYLLA*, Ridley in Trans. Linn. Soc. Ser. 2, III., 329 (1893). *Stem* short with a long woody root, woolly above. *Leaves* crowded, very variable in size, obovate, oblique or lanceolate, crenulate, obtuse; 4 in. long, 1.5 in. wide or less; above dark green, purplish in the centre, glabrous, beneath reddish; nerves raised, covered with red wool on the back. *Peduncles* slender, hairy, 3 in. long; branches short and few; flowers few, small. *Calyx*-lobes linear, pubescent, .125 in. long. *Corolla* campanulate, .25 in. long, violet, pubescent. *Style* longer, pubescent. *Capsule* cylindric, curved, acuminate, 1 in. long, glabrous, splitting for nearly the whole length. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 56.

PAHANG: Tahan River, Ridley 2170. JOHORE: Gunong Janeng, Kelsall.

45. *DIDYMOCARPUS PUMILA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 56 (1905). *Stem* slender, woody, 1 to 3 in. long. *Leaves* crowded at the top, elliptic obovate, obtuse, narrowed at the base and

inaequilateral; .5 to 1.5 in. long, .25 to 1 in. wide; above silky pubescent, beneath dotted with swollen hair-bases; nerves about 6 pairs, elevated, hairy with appressed hairs. *Peduncles* slender, erect, purple, with silky appressed white hairs, 2 to 3 in. tall, subterminal; flowers 1 to 2, terminal, very shortly pedicelled; bract linear, purple. *Calyx*-lobes linear, purple, pubescent. *Corolla* .25 in. long, with a short broad tube, pubescent, purplish-white, hardly bilabiate; lobes rounded, pinkish white. *Stamens* 2; filaments slender, short, filiform. *Ovary* slender, cylindric; style longer than stamens; stigma discoid. *Capsule* .75 in. long, terete, upcurved, splitting along the upper edge, minutely pubescent.

SELANGOR: the Gap—Semangko Pass, alt. 3000 ft., *Curtis* 3782; *Burn-Murdoch*.

AFFINITY DOUBTFUL.

46. *DIDYMOCARPUS LILACINA*, Ridley in Trans. Linn. Soc. Ser. 2, III. 330 (1893). *Stem* 12 to 15 in. long, entirely leafy, brown-pubescent. *Leaves* alternate, spreading, lanceolate, crenate dentate, pubescent, dark green; 4 in. long, 1 in. wide; petiole 1 in. long. *Pedicels* numerous, rising from the petiole near the leaf-blade, slender, .25 in. long, pubescent. *Calyx*-lobes very short, lanceolate, hispid. *Corolla* campanulate, rosy-violet, sparingly pubescent; lobes oblong, rounded. *Stamens* 2; filaments thick, with slender base; anthers reniform. *Style* shorter than the corolla, pubescent; stigma capitate. *Capsule* .65 in. long, rather thick, cylindric, with a short beak. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 57.

PAHANG: Tahan River, *Ridley* 2165.

5. *CHIRITA*, Buch.—Ham.

Herbs or slender shrubs. *Leaves* opposite, often unequal or whorled or alternate; elliptic or ovate. *Peduncles* axillary, 1- or more flowered; bracts free or connate, small or large. *Calyx* 5-lobed, with acute lobes, usually large. *Corolla* infundibuliform or tubular-ventricose, blue or white, 2-lipped; lobes rounded. *Stamens* 2; filaments filiform, geniculate; anthers rounded, connivent, often hairy. *Disk* annular. *Ovary* cylindric, linear; style usually long; stigma ovate or narrow, bifid. *Capsule* long, cylindric.—*DISTRIB.* Species about 26, in India, China, and Malaya.

Bracts free:—

Stems 2 ft. high; leaves ovate; corolla 1 in. long, claret-coloured	.. .. .	1. <i>C. elata</i> .
Stems under 2 ft. high; corolla blue or violet, rarely white:—		

Leaves ovate :—

Corolla 1·5 in. long, azure blue; stems 1 ft. high or more .. 2. *C. caliginosa*.

Corolla ·75 in. long, violet with darker streaks; stems

under 1 ft. high 3. *C. viola*.Leaves lanceolate; corolla blue, rarely white .. 4. *C. sericea*.

Bracts connate; leaves ovate; corolla blue or violet :—

Corolla-tube ·5 in. long 5. *C. rupestris*.Corolla-tube 1 in. long 6. *C. Glasgovii*.

DOUBTFUL SPECIES.

7. *C. mollissima*.

1. CHIRITA ELATA, Ridley in Journ. Linn. Soc. XXXII. 518 (1895).

A tall rough herb, 2 ft. high. *Stem* angled, branched. *Leaves* 3 to 6 in. long, 1·5 to 3 in. wide, ovate, inæquilateral, acute, toothed; with elevated nerves, hispid; petioles slender, 1 in. long. *Cymes* lateral, axillary, 3 in. long, hispid. *Calyx*-lobes lanceolate acuminate, hairy, ·125 in. long. *Corolla* funnel-shaped, hairy, 1 in. long, claret colour; lobes short, rounded, subequal, ·5 in. across. *Stamens* 2; filaments slender; anthers oblong; staminodes short, with abortive anthers. *Ovary* short, pubescent; stigma peltate, sub-bilobed. *Capsule* straight, cylindric. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 57.

PERAK: Larut Hills, Wray 2985; Curtis 2038; Ridley 2911.

2. CHIRITA CALIGINOSA, Clarke in DC. Monog. Phan. V. i. 122 (1883).

A soft herb, 1 ft. or more tall, often branched. *Leaves* opposite; ovate acuminate, base broad or cuneate, very inæquilateral; margins entire or slightly toothed; 2·5 in. long, 1 to 2 in. wide; closely pubescent; petiole ·5 in. long. *Flowers* several, axillary; pedicels ·5 to 1 in. long, pubescent. *Calyx*-lobes lanceolate acuminate, hairy, 5 in. long. *Corolla* 1·5 in. long, azure blue; tube narrow at the base, broadly infundibuliform at the apex, pubescent; lobes large, rounded, ·75 in. across the lips. *Stamens* 2; anthers globose, covered with long hairs at base. *Style* slender, pubescent; stigma bilobed, lobes linear. *Capsule* 3 in. long, slender, cylindric, curved. Clarke in Hook. f. Fl. Br. Ind. IV. 360; Ridley in Journ. Linn. Soc. XXXII. 516, and in Journ. Str. Br. R. As. Soc. No. 43, 58.

PERAK: Kuala Dipang, Curtis 3109; Batu Kuran, Scortechini 1582

SELANGOR: Kuala Lumpur caves, Beccari; Curtis 2359.

3. CHIRITA VIOLA, Ridley in Journ. Linn. Soc. XXXII. 516 (1895).

A herb, 2 to 10 in. tall, pubescent. *Leaves* ovate acute, crenate or serrate or entire, very unequal, 2 to 6 in. long, 1·5 to 3 in. wide; petiole ·125 in. long. *Cymes* short, few-flowered; flowers small; pedicels ·5 in. long. *Calyx*-lobes lanceolate, acute, hispid, nearly ·125 in. long. *Corolla* ·75 in. long, violet; tube narrow at the base, thin, dilated,

trumpet-shaped; upper lobes short, rounded, lower ones ovate obtuse, longer, median one longest, elliptic, all violet with darker streaks and a patch of yellow glandular hairs in the mouth. *Stamens* 2, exsert; anthers yellow, ovoid, with a thickened connective, ciliate at the base, with a black spot on each anther; filaments attached to the mouth of the tube. *Ovary* pubescent; stigma obliquely bifid; lobes linear, obtuse. *Capsule* terete, acute, 1.5 in. long, minutely pubescent. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 59.

KEDAH: Lankawi Islands, *Curtis* 2570.—DISTRIB. S. Siam, on limestone rocks.

4. *CHIRITA SERICEA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 59 (1905). Herb, 3 to 6 in. tall, simple or branched, woolly. *Leaves* alternate, lanceolate, acute or acuminate, base unequal, cuneate; 2 to 3 in. long, .5 in. wide; margins entire; both sides densely covered with short silky hairs; petiole .25 to 1 in. long. *Flowers* 1 to 2, axillary; pedicels .5 in. or less, silky-hairy, ebracteolate. *Calyx*-lobes narrow, linear acuminate, densely silky-hairy. *Corolla* blue, rarely white; tube half as long again as sepals; lobes broader, unequal, oblong, all hairy. *Style* slender, glabrous; stigma bilobed, lobes elliptic. *Capsule* cylindric, 1.5 in. long, silky-hairy.

PERAK: Ipoh, limestone rocks, *Curtis* 3131.

VAR. *Scortechinii*, Ridley, l.c.

Capsule shorter, .5 in. long, and thicker, .125 in. through, splitting longitudinally into 2 valves. *Corolla*-tube straight; lobes of lower lip broad.

PERAK: *Scortechinii* 102, 112.

5. *CHIRITA RUPESTRIS*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 59 (1905). A herb, about 4 to 10 in. tall. *Stem* simple or branched, glabrescent. *Leaves* opposite or alternate, thin, ovate obtuse; 1 to 3 in. long, .5 to 2.5 in. wide; above sprinkled with multicellular hairs. *Flowers* axillary, 1 to 2, sessile, on a peduncle .5 in. long, hairy, enclosed in a green cupular bilobed bract .5 in. long; edges recurved and covered with multicellular hairs. *Calyx*-lobes narrowly lanceolate, hairy, nearly .5 in. long. *Corolla*-tube as long as the bract, hairy, blue, little longer than the calyx-lobes, rounded. *Ovary* and style slender, hairy. *Capsule* cylindric, slender, curved, 2.5 in. long.

KEDAH: Lankawi, on damp rocks, *Curtis* 2120.

6. *CHIRITA GLASGOVII*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 60 (1905). A weak herb, 1 ft. tall, branched. *Leaves* ovate obtuse, thin; 1 to 3 in. long, .75 to 2 in. wide; base rounded, retuse; nerves 5 pairs, alternate; above sprinkled with multicellular hairs, beneath paler with a few hairs on the nerves, otherwise nearly glabrous; petiole

slender, 1 to 2 in. long, glabrous. *Bract* convolute, bilobed; lobes ovate, hairy, 1 in. long. *Calyx*-lobes lanceolate acuminate, narrow, hairy, .5 in. long. *Corolla*-tube 1 in. long, minutely hairy, dark violet. *Capsule* cylindric, curved, 3 in. long, glabrous.

PERAK: Waterloo near Kuala Kangsa, C. Robertson-Glasgow.

DOUBTFUL SPECIES.

7. *CHIRITA MOLLISSIMA*, Ridley in Journ. Linn. Soc. XXXII. 517 (1895). Nearly stemless. *Leaves* congested, lanceolate, acute, obscurely minutely serrate, silvery-tomentose; 6 to 8 in. long, 1.25 to 2 in. broad. *Flowers* pedicelled, drooping, axillary, few, handsome; pedicels somewhat thick, woolly, 1 in. long. *Calyx*-lobes lanceolate, acuminate, equal, .5 in. long, tomentose. *Corolla* funnel-shaped, more than 1 in. long, oblong, obtuse; the upper lobes short, rounded, violet, the lower wider; the tube white in the throat, with glandular hairs above the anthers. *Stamens* 2; filaments broad, curved; anthers broad, thick. *Pistil* pubescent, emerald green, little exsert; the ovary cylindric, attenuated in the style; stigma 2-lobed, pubescent, decurved. *Capsule* 1 in. long, broad, thick, glabrous or pubescent.

SIAMESE STATES: Pangah, Curtis 2944.

6. *TETRAPHYLLUM*, Griff.

Undershrubs; stem elongate, with leaves crowded towards the apex. *Leaves* opposite or in whorls of 4, nearly sessile, ovate, unequal-sided. *Cymes* capitate or lax from the axils of the upper leaves; bracts elliptic, oblong or lanceolate. *Calyx* somewhat large, 5-partite, obscurely 2-lipped. *Corolla* widely funnel-shaped, more or less 2-lipped; lobes 5, subequal, ovate. *Stamens* 2, fertile; filaments short, filiform, often spirally twisted; anthers 2-celled; apex submucronate; cells oblong or ellipsoid, parallel or divergent; staminodes very minute. *Ovary* ellipsoid, acute; style linear; stigma small, capitate, sub-bilobed; placentæ parietal, 2-lamellate; ovules very numerous. *Capsule* ovate or lanceolate, dehiscing both loculicidally and septicidally; having 2 ribs united at the tip and the placentæ split into 2 lamellæ. *Seeds* very minute, ellipsoid; testa reticulate.—DISTRIB. 2 species, one Indian, the other of the Malay Peninsula.

TETRAPHYLLUM ROSEUM, Stapf ex Ridley in Journ. Linn. Soc. XXXII. 524 (1895). *Leaves* opposite, closely approximate, the end ones subverticillate, usually in fours; elliptic or obovate-elliptic, obtuse at apex, narrowed at base; crenate-denticulate; above green, shining, bullate, pilose; beneath pale, punctulate, pilose on the nerves; 2.5 to 3.5 in. long, 1.75 to 2.25 in. broad; petiole .15 to .2 in. long.

Cymes few-flowered, from the axils of the last 3 or 4 leaves, collected in a terminal inflorescence 1 in. long; bracts oblong or lanceolate; pedicels slender, about .2 in. long. *Calyx* deeply 5-fid, scarcely .5 in. long; lobes ovate acute; tube obscurely 5-angled, glabrous. *Corolla* glabrous; tube nearly .5 in. long, white, curved; limb pink, bilabiate, upper lip erect, 2-lobed, lower lip 3-lobed, lobes rounded. *Stamens* included; filaments filiform, spirally twisted, glabrous; anthers adhering at the apex, with a thick connective; cells oblong, divergent at base. *Ovary* oblong, puberulous; style as long as ovary; stigma capitate, sub-bilobed; placentæ 2-lamellate; the lamellæ densely ovule-bearing. *Capsule* ovate-oblong, .3 to .5 in. long, as long as the persistent calyx.

SIAMESE STATES: Pungah, *Curtis*.

7. LOXOCARPUS, Br.

Herbs, scapigerous. *Leaves* ovate or oblong, petiolate, pubescent. *Flowers* 1 or more in a peduncled cyme, blue. *Calyx*-lobes 5, free to base or nearly so. *Corolla* campanulate, small, hardly bilabiate; lobes rounded. *Stamens* 2; filaments short, thick, sinuate; anthers reniform, large. *Ovary* oblong; style longer than stamens; stigma capitate. *Capsule* follicular, conic, dehiscing along the upper edge.—DISTRIB. Species 7, of the Malay Peninsula and Borneo.

Flowers 1 or 2 on slender silky scapes 2 to 2.5 in. long .. 1. *L. semitorta*.

Flowers few or numerous on dichotomously branched viscidly hairy peduncles:—

Peduncles 2 to 4 in. long; flowers few or numerous; capsule

ovoid 2. *L. incana*.

Peduncles 6 to 12 in. long; flowers numerous; capsule cornicu-

late 3. *L. cœrulea*.

1. LOXOCARPUS SEMITORTA, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 61 (1905). Stemless. *Leaves* numerous; ovate or oblong, obtuse, rather thick, base broad; .3 to 1 in. long, .25 to .75 in. wide; above green silky, beneath with thick red-woolly raised nerves; petiole 1 to 2.5 in. long, thick, red-woolly. *Scapes* slender, 2 to 2.5 in. long, silky; flowers 1 or 2. *Calyx*-lobes lanceolate, hairy, .125 in. long. *Corolla* .5 in. long; tube broad, oblique, pale blue with violet streaks in the throat; lobes very short and indistinctly marked. *Stamens*: filaments short, curved; anthers reniform, purple. *Ovary* and style hairy, shorter than corolla, larger than stamens. *Capsule* .25 in. long, horn-shaped, acuminate with the persistent style; base swollen. *Didymocarpus semitorta*, Clarke in DC. Monog. Phan V. i. 99, and in Hook. f. Fl. Br. Ind. IV. 352.

MALACCA: Mount Ophir, *Griffith* (K.D.) 3836; *Maingay* (K.D.) 1220; *Ridley* 3184, and all collectors. On rocks in the stream. "The Mount Ophir Violet."

2. *LOXOCARPUS INCANA*, R. Br. in Benn. Pl. Jav. Rar. 115, 120 (1840), and Ann. Nat. Sci. XIII. 2, 167. Stemless. *Leaves* ovate, cordate, serrulate, subacute, silky-tomentose above and beneath; 1 to 3 in. long, .75 to 1.5 in. wide; petiole .75 to 1 in. long. *Peduncles* 2 to 4 in. long, above dichotomously branched, viscid-hairy; flowers few or numerous. *Calyx*-lobes lanceolate, pubescent, hairy, white tinted green. *Corolla*-tube straight, thick; upper lobes oblong, recurved, lower lobes oblong, blue. *Filaments* straight. *Pistil* conic; style stout; stigma capitate. *Capsule* ovoid; tip upcurved, hairy. Miq. Fl. Ind. Bat. II. 737. *L. alata*, A. DC. Prodr. IX. 277. *Didymocarpus incana*, Benth. and Hook. f. Gen. Pl. II. 1022; Clarke in DC. Monog. Phan. V. 98, and in Hook. f. Fl. Br. Ind. IV. 352; *Ridley* in Journ. Linn. Soc. XXXII. 5121, and in Journ. Str. Br. R. As. Soc. No. 43, 62. *Loxonia* ? *alata*, Wall. Cat. 809.

PENANG: Government Hill, Waterfall, *Curtis* 297; *Maingay* (K.D.) 1228; *Wallich* 809. PERAK: Hermitage Hill, *Ridley*; Bujong Malacca, *Ridley* 9782. SELANGOR: Bukit Kutu, *Ridley*.

3. *LOXOCARPUS CÆRULEA*, *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 62 (1905). Stemless or nearly so. *Leaves* several; ovate; base cordate; serrate, inæquilateral; 2 to 6 in. long, 1.5 to 4 in. wide; silky-hairy above, tomentose beneath; petiole 2 to 8 in. long, pubescent. *Peduncles* 6 to 12 in. tall, viscid-hairy; cymes compact or branched with 2 or 3 branches 2 in. long; flowers numerous; bracts lanceolate, narrow. *Calyx*-lobes lanceolate, narrow, shorter than the tube. *Corolla* pubescent, 2-lipped, .4 in. long and wide; tube short, broad, campanulate; upper lobes oblong obtuse, lower ones truncate, median one longer, blue with a violet mouth. *Stamens* exsert; filaments suddenly thickened in the middle, sigmoid; anthers connate, deep violet. *Style* slender. *Capsule* .4 to .5 in. long, lanceolate acute, horn-shaped, upcurved, viscid. *Didymocarpus cærulea*, *Ridley* in Journ. Linn. Soc. XXXII. 513.

PERAK: Larút Hills, at 5000 ft. alt., *Ridley*; *King's Collector* 6990; *Scortechini* 1427; Gunong Bubú, *Wray* 3809. SELANGOR: Bukit Hitam, *Kelsall*.

8. *PARABCEA*, *Ridley*.

Herbaceous plants or with a shrubby stem. *Leaves* usually in a rosette, tomentose or hairy. *Flowers* small, white or pink, in simple or panicled cymes; peduncle usually long. *Calyx* small. *Corolla* white

explanate, campanulate, with a very short tube, distinctly 2-lipped or nearly regular; lobes equal, oblong or unequal, blunt. *Stamens* 2, fertile; filaments thick, short; anthers large, 2-celled, connivent by the tips. *Disk* none. *Ovary* sessile; style longer than the stamens, stout; stigma small, capitate. *Capsule* straight, narrow, slender, not twisted, splitting longitudinally. *DISTRIB.*—Species about 20. Siam-Malaya.

Corolla-tube, campanulate:—Sect. I. CAMPANULATE:—

Corolla .5 in. long:—

Flowers many in large spreading panicles; leaves sparingly hispid, opposite 1. *P. cordata*.

Flowers solitary or few on slender peduncles:—

Peduncles subterminal; leaves opposite, ovate:—

Leaves hairy on margins and on midrib and nerves beneath; peduncles 1-flowered 2. *P. campanulata*.

Leaves quite glabrous; peduncles branched dichotomously, branches 1-flowered 3. *P. Scortechinii*.

Peduncles axillary; leaves crowded at apex of stem, lanceolate 4. *P. cœrulea*.

Corolla under .5 in. long; flowers few, crowded .. 5. *P. pyroliflora*.

Corolla-tube not campanulate, very short:—Sect. II. BREVIFLORÆ:—

Corolla-lobes equal or subequal, if slightly 2-labiate the lower lip hardly longer than the upper:—

Flowers in compact umbels or cymes on pedicels .5 in.

long or less at the apex of the peduncles:—

Leaves not purple beneath, in a basal rosette; stem 0:—

Flowers umbellate, pedicels .5 in. long; leaves ochreyellow beneath 6. *P. capitata*.

Flowers in compact scorpioid cymes; leaves pale beneath 7. *P. ferruginea*.

Leaves purple beneath, crowded at the apex of a short stem; flowers umbellate, pedicels .25 in. long .. 8. *P. regularis*.

Flowers at the apex of slender cyme-branches 1 to 3 in. long:—

Leaves ochreous-tomentose beneath in a basal rosette; stem 0 9. *P. polita*.

Leaves red-woolly beneath; stem 2 in. long .. 10. *P. vulpina*.

Corolla lobes distinctly unequal, these of lower lip longer than those of upper:—

Calyx-lobes lanceolate; leaves obovate, coarsely toothed, dull green; corolla .25 in. across 11. *P. laxa*.

Calyx-lobes oblong or linear oblong obtuse:—

Leaves oblong-elliptic, sparsely hairy; corolla .5 in. across 12. *P. Curtisii*.

Leaves obovate, arachnoid on both sides, yellowish beneath; corolla .25 in. across 13. *P. obovata*.

1. *PARABŒA CORDATA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 64 (1905). A tall herb, 2 ft. high; stem pubescent. *Leaves* opposite, ovate acuminate, inæquilateral at base, dentate, sparingly hispid above and beneath; nerves 10 pairs, hairy beneath; 6 to 7 in. long, 4 in. wide; petiole 1 in. long. *Peduncles* stout, 6 to 8 in. long, pubescent, bearing a spreading panicle 4 to 6 in. long; bracts in pairs at the base of each bifurcation, ovate, glabrous, .125 in. long; pedicels slender, .5 in. long, glabrous. *Calyx*-lobes lanceolate, free to base, glabrous, .5 in. long. *Corolla* campanulate, .5 in. long, white tinted violet; lobes short, equal, rounded, with 2 rows of glands on each. *Stamens* 2; filaments short; anthers subglobose, large; staminodes minute. *Ovary* slender, glabrous. *Capsule* sausage-shaped, 4-angled, 1.5 in. long, glabrous, rather thick, splitting on two sides. *Seeds* minute, deep red, oblong. *Didymocarpus cordata*, Jack; R. Br. Benn. Pl. Jav. Rar. 119; Ann. Sc. Nat. 2, XIII. 164; Wall. Cat. 781; DC. Prodr. IX. 265; Miq. Fl. Ind. Bat. II. 726; Clarke in DC. Monog. Phan. V. 84, t. 9, and in Hook. f. Fl. Br. Ind. IV. 350; Ridley in Journ. Linn. Soc. XXXII. 514.

PENANG: Wallich 781; Maingay (K.D.) 1224; W. Fox; Curtis 452. PERAK: Larut Hills, *Scortechini* 296, 400; Ridley 2913, 10682; King's Collector 2227, 2331, 6378. Common on rocks at 2000 to 6000 ft. alt.

VAR. *debilis*, Ridley. Rhizome fleshy; stem 6 in. tall, pubescent. *Leaves* thin, ovate oblique; base obtuse; apex acute or subacute; margin crenate dentate; sparingly hispid, 1.5 to 4 in. long, 1 to 2 in. long. *Panicle* 4 to 6 in. long, glabrous, weak, few-branched; branches short and thin; bracts ovate; flowers smaller.

KEDAH: Gunong Jerai, Ridley.

VAR. *ophirensis*, Ridley.

Tall and weak. *Leaves* thin, lanceolate, subacute or acute, narrowed at the base; 6 in. long, 2 in. wide. *Panicle* weak, glabrous; bracts lanceolate; flowers smaller, white. *Capsule* smaller, curved, .4 in. long.

MALACCA: Mount Ophir, on a big cliff in the forest below Padang Batu, Ridley 3183.

2. *PARABŒA CAMPANULATA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 65 (1905). *Stem* slender, herbaceous, 1 ft. tall, shortly hairy. *Leaves* opposite, in distant pairs, elliptic acute, entire or obscurely crenulate; above glabrous except the edge fringed with multicellular hairs; beneath glabrous except the midrib and elevated nerves about 12 pairs; scurfily hairy; 2.5 to 3.5 in. long, 1.25 in. wide; petiole scurfy-hairy .125 to .375 in. long. *Peduncles* subterminal, 1.5 in. long, 1-flowered, rufous-hairy; bracts 2, alternate, linear, minute; pedicel 5 in. *Calyx*-lobes linear, hairy, .125 in. long. *Corolla* campanulate, .5

in. long, apparently white; lobes broad, rounded. *Stamens* 2, very short; anthers subglobose. *Style* slender, pubescent. *Capsule* (unripe) cylindric, velvety, .75 in. long, including the style.

SELANGOR: above the Gap on the road to the Sempang mine, 3000 to 4000 ft., *Curtis*—a single specimen.

A very distinct plant of a weedy habit, with solitary flowers of the type of *P. cordata*.

3. *PARABÆA SCORTECHINII*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 66 (1905). *Stem* herbaceous, glabrous. *Leaves* opposite; ovate acuminate; base rounded, inæquilateral; margins crenate; quite glabrous; nerves 8 pairs; 3 to 3.5 in. long, 1 to 2.5 in. wide; petiole .5 in. long. *Peduncle* slender, erect, subterminal, 3 in. long, glabrous; branches dichotomous, few, 1 in. long; flowers solitary on the ends of the branches. *Calyx*-lobes free almost to the base, oblong obtuse, .125 in. long, glabrous, fleshy. *Corolla* campanulate, .5 in. long, glabrous; lobes rounded. *Anthers* broad, elliptic; filaments very short.

PERAK: *Scortechinii* (no number or locality).

A single incomplete specimen. The plant is allied to *P. cordata*, of which it has quite the flowers, but is quite glabrous.

4. *PARABÆA CÆRULEA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 66 (1905). *Stem* woody, 3 to 4 in. long, .125 in. through. *Leaves* crowded at the top, narrowly lanceolate, linear acuminate, narrowed gradually to the base; 4 to 5 in. long, .25 in. wide; above dark green, nearly glabrous; midrib prominent, beneath pale cinnamon colour; nerves about 30 pairs joined at the tips. *Peduncles* slender, axillary, 4 in. long, pubescent, 1- to 2-flowered. *Calyx*-lobes linear, .125 in. long, obtuse. *Corolla* campanulate, .5 in. long and nearly as wide at the base, pubescent, base pale; lobes deep blue, rounded. *Stamens* 2; filaments very short, sigmoid; anthers broad, rounded, oblong. *Style* fairly stout; stigma heart-shaped. *Capsule* very narrow, cylindric, 1 in. long.

TRINGGANU: Bundi, *E. Rostado*. The upper part of the stem among the leaves is covered with silvery hairs.

5. *PARABÆA PYROLIFLORA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 67 (1905). *Stem* woody, 3 in. tall or more, pubescent. *Leaves* alternate, ovate or ovate lanceolate, acuminate at both ends; 3 to 4 in. long, 1.5 in. wide; entire; bright green, silky pubescent above, beneath paler; petiole over 1 in. long, pubescent. *Peduncles* several from the upper axils, erect, 3 to 4 in. long, shortly hairy. *Calyx*-lobes lanceolate, short-pubescent. *Corolla* campanulate, funnel-shaped, white, .4 in.

long; lobes short, rounded. *Stamens* 2; filaments short and thick; anthers large, elliptic. *Style* thick, curved upwards, longer than the corolla; stigma very small, capitate. *Capsule* spreading, 1 in. long, terete, terminated by rather a long style, glabrous. *Didymocarpus pyroliflora*, Ridley in Trans. Linn. Soc. Ser. 2, III. 330.

PAHANG: Tahan river woods, *Ridley* 2164.

6. *PARABÆA CAPITATA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 67 (1905). Stemless or with a stout rootstock. *Leaves* in a rosette, orbicular, base rounded, subpeltate; 6 in. long, 5 in. wide; bright green, glabrous above, ochre-yellow beneath; tomentose; nerves raised, reticulate; petiole stout, 2 in. long. *Peduncle* slender, 8 in. tall; flowers numerous in an umbel on the top, with 2 broad, blunt, oblong bracts, .25 in. long, below. *Pedicels* .5 in. long. *Calyx* campanulate; lobes linear, oblong, obtuse, .3 in. long, green, hairy. *Corolla* .5 in. across; lobes subequal, rounded, white. *Filaments* very short, straight; anthers reniform. *Style* curved up, longer than corolla, white. *Capsule* spreading, linear, straight, beaked, 1.5 in. long.

PERAK: Bujong Malacca, *Curtis* 3215; Kamuning, *Machado*. On limestone rocks.

VAR. *oblongiflora*, Ridley. *Leaves* oblong, narrowed at the base.

PERAK: Kuala Dipang and Sungei Siput, *Curtis* 3107; Tambun *Ridley* 9832; Batu Kuran, *Scortechini* 1581; Goping, *King's Collector* 456, 4325.

7. *PARABÆA FERRUGINEA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 68 (1905). Stemless or nearly so. *Leaves* in a rosette, ovate cordate, obtuse, crenulate; above covered with scattered hairs, below tomentose with longer hairs, paler; nerves elevated; 3 in. long, 2.5 in. wide; petiole 1.5 to 2 in. long. *Peduncles* 3 in. long, ferruginous-tomentose; cyme compact, scorpioid, ferruginous-hispid. *Calyx*-lobes as long as the corolla, green, ferruginous-hispid, lanceolate. *Corolla*-tube very short; limb explanate, not bilabiate; lobes broad, obovate, obtuse, subequal and similar, white or tinted with rose. *Stamens* 2, short; filaments broad, spatulate, thick; apex 3-toothed; anthers conic, connate by the tips. *Ovary* conic; stigma rounded, entire, discoid.

KEDAH: Lankawi, on damp rocks, *Curtis* 2566.

8. *PARABÆA REGULARIS*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 68 (1905). *Stem* woody, 1.5 in. long. *Leaves* crowded at the top, very unequal, oblong-lanceolate, obtuse, base cuneate inæquilateral; margins crenulate; dark green, glabrous above, purple, minutely tomentose beneath, with elevated nerves; 3 in. long, 1.5 in. wide; petiole 1.5 in. long, tomentose. *Peduncles* slender, pubescent, 1 in. long; branches

very short and slender, .25 in. long, umbelled, brown-tomentose; bracts lanceolate, obtuse; flowers few, very small, very shortly pedicelled. *Calyx*-lobes lanceolate, brown-tomentose, as long as the corolla-tube. *Corolla* hardly .25 in. across, white; lobes oblong, obtuse, equal, not bilabiate. *Stamens* 2; filaments sigmoid, thick; anthers rounded, ovoid. *Style* longer than stamens; stigma capitate. *Capsule* .5 in. long, cylindric, scabrid, rather thick, straight. *Didymocarpus regularis*, Ridley in Journ. Linn. Soc. XXXII. 515.

KEDAH: Lankawi Islands, *Curtis*.

9. *PARABÆA POLITA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 69 (1905). Stemless. *Leaves* in a rosette, ovate, crenate, obtuse; base rounded; above deep shining green, beneath ochreous tomentose, with nerves and nervules reticulate; 1 to 8 in. long, 4 to 4.5 in. wide; petiole 4 in. long. *Peduncle* over 1 ft. long, slender, with brown ochreous fur; branches few, 3 in. long, umbellate; bracts linear, oblong obtuse, brown-woolly; pedicels .25 in. long. *Calyx*-lobes linear, green, .125 in. long. *Corolla* sub-bilobed, .5 in. across, white, back tinted pink; lobes rounded. *Stamens* 2; filaments thickened at the base; anthers orange, reniform. *Style* stout, pink at base, white above; stigma capitate.

PERAK: Bujong Malacca, *Curtis* 3214 part.

Ridley thinks it is perhaps a hybrid between *P. capitata* and *P. vulpina*.

10. *PARABÆA VULPINA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 69 (1905). *Stem* 2 in. long, thick, covered with red wool. *Leaves* elliptic, rounded at each end, crenulate, above sprinkled with pale multicellular hairs, beneath covered densely with branched rufous hairs arranged stellately; nerves beneath strongly elevated, 6 pairs; reticulations elevated; 1.5 to 3 in. long, 1 to 2 in. wide; petiole 1 to 3 in. long, densely red-woolly. *Peduncles* slender, 6 to 8 in. long, red, with a few branched hairs; branches slender, 1 to 3 in. long, trichotomous; bracts very small, linear, obtuse, glabrous. *Calyx*-lobes narrow, linear, glabrous. *Corolla* white, .25 in. across; lobes rounded, subequal. *Stamens* 2; anthers very large, reniform. *Style* short, thick. *Capsule* cylindric, narrow, glabrous.

PERAK: Bujong Malacca, *Curtis* 3214; Hot Springs, Ipoh, *Curtis* 3132. On limestone rocks.

11. *PARABÆA LAXA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 70 (1905). *Stem* very short, woody, thickly brown-tomentose. *Leaves* obovate, coarsely crenate-serrate, narrowed at the base into the winged petiole; 3 to 7 in. long, 2 to 3 in. wide; dull green, densely hairy, tomentose on both surfaces. *Peduncle* slender, 5 to 6 in. long, terminated by a much-branched umbel of slender branches 3 in. long; pedicels

slender, .125 in. long; flowers numerous; bracts very small. *Calyx* shortly 5-cleft; lobes lanceolate, short, green. *Corolla* .125 in. across, white or tinted rosy; upper lobes broad, oblong, recurved; lower lip shortly trifid; central lobe broadest. *Filaments* short, swollen in the middle; anthers yellow, reniform. *Style* longer than stamens. *Capsule* linear, cylindric, straight, .5 in. long, tipped with the elongate style.

KEDAH: Lankawi at Kwah, *Curtis* 2571.

12. *PARABEA CURTISII*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 70 (1905). Stemless. *Leaves* oblong, elliptic, crenate, obtuse; 6 in. long, 2.5 in. wide; above sprinkled with hairs; petiole rufous-hairy, 1.5 in. long. *Scapes* 10 in. long, rufous-tomentose, bearing an umbel of 4 or 5 branches at the top about 2 in. long; bracts at base of umbel oblong, obtuse, .25 in. long; pedicels short, rufous-tomentose. *Calyx*-lobes linear, oblong, obtuse, hairy, .125 in. long. *Corolla* .5 in. across, white; buds tinted pink; tube very short; limb bilobed; upper lobes short, rounded, lower lobes larger. *Stamens*: filaments very short, thick, curved; anthers reniform, triangular. *Style* much longer than stamens, bent. *Ovary* cylindric; stigma wide, discoid. *Capsule* (unripe) cylindric, acuminate, straight.

PERAK: Bujong Malacca, *Curtis* 3214.

13. *PARABEA OBOVATA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 71 (1905). *Stem* short. *Leaves* crowded at the top, thin, obovate, blunt; base cuneate; 3 in. long, 1.5 in. wide; thinly arachnoid on both surfaces, beneath yellowish; petiole .25 in. long. *Peduncle* slender, 3 to 6 in. long, glabrous; branches few, terminal; bracts narrowly oblong, obtuse. *Calyx*-lobes oblong, obtuse, glabrous. *Corolla* .25 in. across; lower lip longer than upper one; lobes oblong, rounded. *Stamens* 2; anthers reniform; filaments short and thick. *Style* short and thick; stigma capitate.

KEDAH: Lankawi, Gunong Chinchang, *Curtis*. One specimen only seen.

9. *BÆA*, Commers.

Herbs or shrublets with a woody stem. *Leaves* opposite or whorled, generally on the back. *Peduncles* axillary, usually elongate, laxly or compactly cymose or paniced; bracts small; flowers large or small, blue or white. *Calyx* of 5 narrow sepals. *Corolla* widely campanulate, with a short tube usually distinctly 2-lipped; lobes ovate, obtuse. *Stamens* 2, perfect, with short curved thick filaments; anthers ovoid, coherent; cells ovoid. *Disk* absent. *Ovary* sessile; style as long, glabrous above; stigma small, capitate. *Capsule* slender, cylindric or

fusiform-cylindric, when ripe spirally twisted. *Seeds* minute.—DISTRIB. Species about 22 in India, Siam, China, and Malaya.

Corolla limb 1·5 in. across, blue ; sepals pubescent ..	..	1. <i>B. paniculata</i> .
Corolla limb less than 1 in. across :—		
Calyx-lobes more or less pubescent :—		
Stems 1 ft. or more in height :—		
Corolla blue :—		
Leaves white beneath .. ..	..	2. <i>B. verticillata</i> .
Leaves yellowish-brown beneath .. ..	..	3. <i>B. caerulea</i> .
Corolla white .. ..	..	8. <i>B. suffruticosa</i> .
Stems under 6 in. in height :—		
Leaves arachnoid above ; corolla rose-pink ..	..	5. <i>B. lanata</i> .
Leaves glabrous above .. ..	..	6. <i>B. acutifolia</i> .
Calyx-lobes glabrous :—		
Leaves arachnoid above ; corolla white with pink mouth ..	..	4. <i>B. elegans</i> .
Leaves glabrous above :—		
Corolla pale lilac .. ..	..	7. <i>B. divaricata</i> .
Corolla white .. ..	..	9. <i>B. parviflora</i> .

DOUBTFUL SPECIES.

10. *B. putens*. 11. *B. glabra*. 12. *B. ferruginea*.

1. *BÆA PANICULATA*, Ridley in Journ. Linn. Soc. XXXII. 519 (1895). *Stem*-base woody, 4 in. or more long, ½ in. thick ; above a rosette of leaves ; upper part of stem 1 ft. or more long, stout, deeply grooved, white-arachnoid ; branches numerous, whorled, erect, 6 in. long, covered with brown wool. *Leaves* crowded in a rosette at the top of the woody portion of the stem, lanceolate acuminate, narrowed for a long distance at the base ; 6 in. long, 1 in. wide ; above grey arachnoid, beneath greyish-white with cinnamon-coloured raised nerves. *Flowers* numerous ; pedicels ½ in. long ; bracts 4 or 5 at each whorl of branches, leafy. *Calyx*-lobes short, lanceolate, pubescent, 125 in. long. *Corolla*-tube very short ; limb 1·5 in. wide, blue ; lobes large, rounded, unequal. *Filaments* short and thick, 25 in. long. *Style* curved, as long as stamens. *Capsule* 75 in. long, thick. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 72

SELANGOR : limestone rocks, Kuala Lumpur, *Kelsall* and *Ridley* 1970, 1976 and 8226. PERAK : Sungei Siput, *Curtis* 3105 ; Kuala Dipang, *King's Collector* 8271 ; Batu Kuran, *Scortechini* 1611. A superb plant growing in the cracks of limestone rocks.

2. *BÆA VERTICILLATA*, Ridley in Journ. Linn. Soc. XXXII. 519 (1895). *Stem*-base woody, 3 in. or more long, nearly 25 in. in diameter ; above herbaceous, 1·5 ft. tall, 4-angled, white-arachnoid with branches whorled, each whorl 3 in. or less apart. *Leaves* whorled, lanceolate acuminate, narrowed at the base into a petiole ; 4 in. long, 75 in. wide or more ;

above grey-arachnoid, beneath white-arachnoid with raised nerves. *Flowers* numerous, blue; bracts leafy, .25 to .5 in. long. *Calyx*-lobes lanceolate subulate, arachnoid, .125 in. long. *Corolla* .5 in. wide; lobes rounded. *Stamens* very short; anthers pear-shaped. *Style* much longer than stamens, straight. Capsule fusiform, acuminate, .5 in. long. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 73.

SELANGOR: limestone rocks at Kuala Lumpur, *Kelsall, Ridley* 1975, 8551.

3. *BÆA CÆRULESCENS*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 73 (1905). Whole plant over 2 ft. tall; upper part of stem stout, grooved, woolly. *Leaves* oblanceolate, subobtusate, narrowed to the base; above dark green, densely pubescent, beneath ochreous covered with felted wool; 6 to 8 in. long, 1.25 to 2 in. wide; petiole winged to the base or not. *Panicle* 2 ft. or more long, large; branches whorled, yellow-woolly; bracts below leaf-like, above linear, narrow, yellow. *Calyx*-lobes lanceolate, woolly. *Corolla*-tube very short; limb .75 in. across, pale blue, upper lobe shorter; lobes rounded; lower lip unequally lobed, longer, central lobe longest. *Stamens* 2; anthers reniform, conic, large; filaments short, curved. *Style* bent on the cylindric ovary, pubescent; stigma large, discoid. *Capsule* thick, glabrous, .75 in. long.

PERAK: Sungei Siput, *Curtis* 3137; Kinta, *King's Collector* 7175, 7062, 8276.

4. *BÆA ELEGANS*, Ridley in Journ. Linn. Soc. XXXII. 522 (1895). *Stem* about 6 in. long, woody, decumbent, .125 in. thick, arachnoid. *Leaves* whorled in threes, .5 to 3 in. apart, lanceolate acute, narrowed to the base; 1 to 2.5 in. long, .25 to .5 in. wide; above grey-arachnoid, beneath cinnamon-arachnoid. *Peduncles* from the upper axils, slender, glabrous, 6 in. long; cyme terminal, 3 in. long, with few slender branches. *Calyx* very short; lobes lanceolate, glabrous. *Corolla* .5 in. across, with broad rounded lobes, white-pink in the mouth. *Anthers* oblong. *Style* rather short; stigma clubbed. *Capsule* 1 in. long, glabrous, linear, acuminate. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 74.

KEDAH: Gunong Jerai on granite precipices, *Ridley*.

5. *BÆA LANATA*, Ridley in Journ. Linn. Soc. XXXII. 520 (1895). *Stem* short, stout, woody, 2 in. long, curved, with white wool. *Leaves* crowded, lanceolate acuminate, narrowed into the petiole; arachnoid above, densely woolly beneath; 3 in. long, .75 in. wide; petiole woolly, 3 in. long, winged to base. *Panicles* few, branched, axillary, dense, 1 to 5 in. long. *Calyx* as long as the corolla-tube; lobes lanceolate, woolly outside. *Corolla* thin, .5 to .75 in. across, glabrous, rose-pink;

lobes rounded. *Anthers* subglobose. *Style* thick. *Capsule* .5 in. long, thick, glabrous. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 74.

KEDAH: Langkawi, Dayong Bunting, on limestone rocks, *Curtis* 2569.

6. *BCEA ACUTIFOLIA*, Ridley in Journ. Linn. Soc. XXXII. 519 (1895). *Stem* woody, 3 in. or more long, .25 in. through; internodes .5 in. long. *Leaves* crowded at the top, oblanceolate, acute, narrowed to the base; 6 in. long, 1.5 in. wide; above glabrous dotted, beneath cinnamon-arachnoid. *Panicles* axillary, 6 in. long; peduncles arachnoid; branches short, slender. *Calyx*-lobes 3, lanceolate, acute, .125 in. long, arachnoid. *Capsule* cylindric, acute, glabrous, .75 in. long. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 75.

KEDAH: Langkawi, Goa Chinta, *Curtis* 2791.

7. *BCEA DIVARICATA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 75 (1905). *Stem* about 4 in. tall, thick and woody. *Leaves* in a rosette on the top, oblanceolate, crenulate, obtuse, narrowed into a winged petiole; nerves and nervules beneath elevated, 15 pairs; above glabrous, beneath covered with a thin brownish tomentum; 7 in. long, 2.5 in. wide. *Peduncles* rather stout, terete, smooth, 7 to 16 in. tall; branches umbellate, decompound, 1 ft. or more long; pedicels of flowers .2 in. long, covered with brown fur. *Calyx*-lobes lanceolate, acute, green, glabrous, shorter than the corolla-tube. *Corolla* .25 in. across, pale lilac; tube short, dilated; limb bilabiate, lobes rounded. *Stamens*: anthers connate, rounded with acute bases; filaments thick, sigmoid. *Style* slender; stigma horseshoe-shaped. *Capsule* cylindric, strongly twisted, 1 in. long.

KEDAH: Lankawi, Ayer Hangat, *Curtis* 3683.

8. *BCEA SUFFRUTICOSA*, Ridley in Journ. Linn. Soc. XXXII. 518 (1895). A branching shrub, 1 to 2 ft. tall, with rather slender branches .125 in. through, angled, slightly arachnoid. *Leaves* scattered, lanceolate, subacute, narrowed at the base; 3 in. long, .5 in. wide; above nearly glabrous, punctate, beneath covered with brownish tomentum; nerves conspicuous; petiole .25 to .5 in. long. *Panicles* axillary, dense, 1 in. long, with short branches brownish-woolly; buds brown-woolly. *Calyx* longer than the corolla-tube; lobes linear, lanceolate, thick, tomentose outside. *Corolla* .25 to .35 in. across, white; lobes short, oblong, rounded. *Anthers* oblong, obtuse. *Capsule* fusiform, very thick, .25 in. long, tipped with the long style. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 76.

KEDAH: Langkawi, on a small island north of Kwah, *Curtis* 3682, 2565.

9. *BCEA PARVIFLORA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 988

76 (1905). *Stem* slender, shrubby, branching, covered with ferruginous tomentum. *Leaves* lanceolate, acuminate; base cuneate, unequal; 4 in. long, 1 to 1.25 in. wide; above glabrous, beneath covered with rusty wool; nerves elevated, 11 pair. *Peduncle* 6 in. long, slender, glabrous; panicle umbellate, of 6 slender branches in a terminal whorl; branchlets glabrous, numerous, slender; bracts very narrow, linear; flowers very small, numerous, white; pedicels slender, .125 in. *Calyx*-lobes lanceolate, glabrous, 5. *Corolla* very small, white; tube very short; upper lobes subacute, lower ones oblong. *Anthers* large, reniform. *Style* shorter than anthers. *Capsule* very slender, cylindric, .25 in. long, terminated by the slender style.

PERAK: Hot Springs at Ipoh and Sungei Siput, not common, *Curtis* 3134; Kinta, *King's Collector* 7108. On limestone rocks.

DOUBTFUL SPECIES.

10. *BÆA PATENS*, Ridley in Journ. Linn. Soc. XXXII. 520 (1895). Almost stemless. *Leaves* rosulate, oblong, obtuse, serrulate-crenulate, inæquilateral; 4 to 6 in. long, 2 to 3 in. broad; upper surface softly pubescent, lower pale ferruginous-tomentose; petiole 1 in. long. *Peduncle* stout, terete, 18 in. long, softly ferruginous-lanate; branches long, divaricate, 2-forked; primary bracts oblong, .25 in. long, secondary smaller; cymules scorpioid, few-flowered; flowers small, white, .125 in. broad; pedicels .06 in. long. *Calyx*-lobes free to the base, short, lanceolate, acute, glabrous. *Corolla* campanulate, glabrous; lobes 2 oblong-obtuse, 3 ovate-obtuse, shorter and broader. *Stamens* with short slender curved filaments as long as tube; anthers large, oblong. *Pistil* glabrous; ovary cylindric, attenuated into a slender little-exsert style; stigma small, scarcely dilated. *Capsule* .5 in. long, glabrous, very slender.

SIAMESE STATES: Pungah, *Curtis*.

11. *BÆA GLABRA*, Ridley in Journ. Linn. Soc. XXXII. 521 (1895). A succulent, glabrous herb; stem short, 1 to 2 in. long. *Leaves* undulate, ovate-rotundate, inæquilateral, 6 in. long, 3.5 in. broad or broader; petiole 1 to 2 in. long, thick; upper leaves smaller, opposite. *Peduncles* subterminal, 3 to 4 in. long, thick; cymes terminal, congested, scorpioid, .5 in. long; pedicels short. *Calyx*-tube short, conical; lobes 5, equal, obcuneate, truncate, .125 in. long. *Corolla* white, .5 in. broad; lobes rounded, obtuse. *Stamens* 2; filaments sigmoid, broad at the base, attenuate above; anthers oblong, acute on both sides, rather large. *Style* cylindric, thick, glabrous, curved; stigma scarcely thickened, obliquely ovate.

SIAMESE STATES: Pungah, *Curtis* 3039.

12. *BÆA FERRUGINEA*, Ridley in Journ. Linn. Soc. XXXII. 521 (1895). Stemless or with a short thick stem; roots large and thick. *Leaves* many, congested, spreading, ovate, cordate, obtuse, crenulate; upper surface clothed with sparse hairs, lower green, paler, tomentose, the raised nerves clothed with long hairs; when dry somewhat black above, ferruginous-tomentose beneath; blade 3 in. long, 2.5 in. broad; petiole 1.5 to 2 in. long. *Peduncles* 3 in. long, ferruginous-tomentose; cyme scorpioid, ferruginous-hispid. *Calyx*-lobes linear-lanceolate, as long as the corolla, green, ferruginous-hispid. *Corolla* .3 to .5 in. broad, white or pink, spreading; lobes broad, equal, obovate-obtuse; tube very short. *Stamens* 2, short; filaments broad, spatulate, 3-toothed at apex; anthers yellow, conical, cuneate at the tips. *Ovary* conical, attenuate in a short, curved, cylindric, narrowed style; stigma rather broader, flat, entire.

KEDAH: Langkawi Island, on damp rocks, *Curtis* 2566.

Ridley remarks that, not having seen the fruit, he is uncertain as to the genus.

10. *PHYLLOBÆA*, Benth.

Herbs or half-shrubby plants. *Leaves* opposite, petioled. *Cymes* pedunculate, many-flowered; bracts large, conspicuous; flowers large, pink or blue. *Calyx* large, 2-lipped; one lip 2-lobed, the other 3-lobed or of 3 large connate sepals. *Corolla* broadly campanulate, 2-lipped, 3- to 5-lobed. *Stamens* 2, short; anthers large, rounded. *Capsule* lanceolate, at length twisted.—*DISTRIB.* Species 2, one Burmese, one Malayan.

PHYLLOBÆA SPECIOSA, Ridley in Journ. Linn. Soc. XXXII. 522 (1895). A shrub, 1 or 2 ft. tall; stems white-tomentose. *Leaves* in distant pairs, lanceolate-acuminate, 6 in. long, 1.5 in. wide; above glabrous, beneath white-arachnoid; petiole 1 in. long. *Peduncle* stout, lateral, erect, nearly a foot tall; flowers sessile, scattered; bracts ovate, lanceolate, .5 in. long, white-arachnoid. *Calyx* of 3 sepals, connate, ovate, oblong, woolly, .4 in. long. *Corolla* 1 in. long, blue; tube broad; lobes 3, two oblong-truncate, the third much broader. *Stamens* short, not longer than the ovary. *Style* long, woolly. *Capsule* 1 in. long, lanceolate, cylindric, acuminate, woolly.

KEDAH: Langkawi, common on limestone rocks on the small islands, *Curtis* 2564.

11. *BÆICA*, Clarke.

Herbs or half-shrubby plants with the habit of *Bæa*. *Leaves* oblong, elliptic or lanceolate, more or less tomentose or hairy. *Inflor-escence* racemose or paniced, axillary; flowers small, lilac or white. *Calyx* 5-fid. *Corolla*-tube very short; lobes subequal, rounded. *Sta-*

mens 4; filaments very short; anthers rounded, connivent. *Style* curved, larger than the stamens. *Capsule* linear cylindric.—**DISTRIB.** Species 4 or 5, in Assam, Burma, and the Malay Peninsula.

Ridley says: "Most of the few described species are based on flowerless specimens, and are all very similar and closely resemble *Baea divaricata* in habit, but the capsule is straight and not twisted. The type-species, however (*B. filiformis*, Clarke), has 4 stamens instead of 2. The Malayan one described below differs from these in habit, and I have seen no fruit, but there is no other genus to which it can be referred on account of its 4 very short stamens arranged in a circle round the pistil. The only other genus allied to it is *Platystemma*, a Himalayan plant with distinctly 2-lipped flowers."

BEIGA BRACHYANDRA, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 78 (1905). Stemless. *Leaves* obovate, serrate, hairy, dark green, obtuse; 3 in. long by 1.5 in. wide; nerves 6 or 7 pair; covered beneath with long red hairs; back of leaf punctate. *Scape* short, few-flowered, about 3 in. long, hairy, unbranched. *Calyx*-lobes free nearly to base, linear, hairy, green, nearly as long as corolla-lobes. *Corolla*-tube very short; lobes broad, rounded, oblong, explanate, subequal, pale lilac, about .5 in. across. *Stamens* 4; filaments very short; anthers broad, waxy, subglobose, connivent round the pistil. *Style* longer than stamens, slender, curved, white. *Capsule* cylindric, narrow, 1 in. long, scabrid, straight, on pedicels elongated to .5 in.

KEDAH: Langkawi, Gunong Chinchang, at Kwala Malacca, *Curtis*.

Ridley says this plant was found quite dried up in February, 1899, but was brought in alive and flowered in the Botanic Gardens, Penang.

12. ORCHADOCARPA, Ridley.

Herb or shrublet, with opposite unequal leaves. *Flowers* small, blue, racemose or cymose, pedicelled. *Calyx*-lobes free to base, narrow-lanceolate. *Corolla*-tube short; limb 2-lipped unequally. *Stamens* 2; filaments short, exsert, sinuate, glabrous; anthers bilobed, reniform, connivent by their edges. *Ovary* hairy, oblong; style short; stigma capitate. *Capsule* oblong, hairy, enclosed in the sepals.—**DISTRIB.** One species, Malayan.

ORCHADOCARPA LILACINA, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 78 (1905). *Stem* short to 4 in. long, stout, woody. *Leaves* crowded at the top, long-petioled, thin, ovate or ovate-lanceolate, acute, strongly serrate, covered with closely-felted short hairs; base broad, inequilateral; 3 to 7 in. long, 1.5 to 3 in. wide; petiole slender, 3 to 6 in. long. *Peduncle* 3 to 4 in. long, pubescent, villous, bearing a terminal, pubescent, umbelliform panicle, or simply racemose. *Calyx*-lobes linear, pubescent, .1 to .2 in. long. *Corolla* pale lilac-blue; tube very short; limb dis-

tinctly bilabiate, upper lip smaller lobes short rounded, lower lip longer, trifold; median lobe longer than the others, oblong-obtuse, pubescent across. *Stamens* 2; filaments from the mouth of the corolla-tube, thick, twisted at the top; anthers large, reniform. *Ovary* oblong, pubescent; style distinct; stigma very small, capitate. *Capsule* short, oblong, hairy, enclosed in the calyx, beaked.

PERAK: *Scortechini* 406; Gunong Batu Putih, *Wray* 298, 302.

13. LEPADANTHUS, Ridley, n. gen.

Herb with fistular stem. *Leaves* opposite, petioled, ovate, toothed. *Flowers* in axillary or terminal, flexuose, distichous racemes. *Calyx*-lobes free nearly to the base, ovate acute. *Corolla* as long as calyx, bilabiate; upper lobe much the shorter. *Stamens* 2 fertile; anthers elliptic. *Ovary* elliptic; style long; stigma oblique, entire. *Capsule* as long as calyx-lobes, loculicidal; placentæ thick, elevated. *Seeds* very minute, warted.—DISTRIB. One species.

The plant on which the genus is founded has the habit of *Rhyncotecom*, but the fruit is capsular.

[LEPADANTHUS, Ridley, gen. nov. Herbacea, caule fistuloso. *Folia* opposita, petiolata, ovata, dentata. *Flores* distichi in racemis axillaribus vel terminalibus flexuosus. *Calycis* lobi fere ad basin liberi, ovati, acuti. *Corolla* calyci æqualis, bilabiata, labio superiore multo brevior. *Stamina* 2 fertilia; antheræ ellipticæ. *Ovarium* ellipticum, stylo longo, stigmate obliquo, integro. *Capsula* calycis lobis æquilonga, loculicida, placentis crassis elevatis. *Semina* minutissima, verrucosa.]

LEPADANTHUS FLEXUOSA, Ridley, n. sp. A herb, reaching 18 in. in height; stem hairy, fistular. *Leaves* very thin when dry; ovate, sub-acute, rounded and slightly unequal at base, strongly toothed; 5 in. long, 4 in. wide; nerves about 8 to 10 pair, hairy; petiole slender, 3 to 4 in. long. *Racemes* several, pubescent, 3 to 4 in. long, including the 1 to 1.5 in. long peduncle; rachis flexuose with distant alternate flowers on capillary secund pedicels .5 in. long; bracts in pairs, linear, deflexed, .125 in. long. *Calyx*-lobes 5, ovate, acuminate, pubescent, 3-nerved. *Corolla* small; tube short, thick; upper lip bifid, much shorter than the lower, glabrous. *Stamens* 2; filaments extremely short, adnate to the corolla-tube; anthers elliptic. *Ovary* elliptic; style pubescent, as long as calyx-lobes or longer; stigma clavate, oblique. *Capsule* .25 in. long, oblong, glabrous. *Seeds* elliptic, dark red.

KEDAH: inside the caves, Gunong Grenong, *Fox* 3811 (a poor specimen only).

[*L. FLEXUOSA*, Ridley, sp. nov. Herba pubescens caule 40-50 cm. alto fistuloso. *Folia* siccitate tenuissima, ovata, subacuta, rotundata, ad basin parum inaequalia, dentata: 12 cm. longa, 10 cm. lata; nervi utrinque 8-10, pubescentes; petiolus gracilis, 7-10 cm. longus. *Racemi* plures, pubescentes, cum pedunculo 7-10 cm. longi; rhachis flexuosa, floribus alternis distantibus, pedicellis secundis capillaribus; bractae geminae lineares deflexae, 3 mm. longae. *Calycis* lobi 5, ovati, acuminati, pubescentes, trinervi. *Corolla* parva, tubo brevi crasso; labium superius bifidus, inferiori multo brevius. *Stamina* 2; filamenta brevissima, tubo corollae adnata. *Ovarium* ellipticum; stylus pubescens, calycis lobis aequilongus vel longior; stigma clavatum, obliquum. *Capsula* 6-7 mm. longa, oblonga, glabra. *Semina* elliptica nigro-rubra.

PENINSULA MALAYANA: in Prov. Kedah in specubus ad Gunong Grenong.]

14. RHYNCHOGLOSSUM, Blume.

Herbs, succulent and nearly glabrous. *Leaves* opposite, thin. *Raceme* terminal, lax; flowers pendent. *Calyx* campanulate, toothed or lobed. *Corolla*-tube cylindric, narrowed above; limb bilobed; upper lobe very short bifid, lower much longer, 3-lobed. *Stamens* 2 perfect, affixed to the middle of the corolla-tube; anthers connivent; cells ellipsoid, parallel; staminodes 2, or absent. *Disk* cylindric. *Ovary* ovoid, glabrous; style longer; stigma dilate. *Capsule* included in the calyx, ellipsoid, membranous, 2-valved. *Seeds* narrowly ellipsoid, smooth.—*DISTRIB.* Species 2, in India, Malaya and the Philippines.

RHYNCHOGLOSSUM OBLIQUUM, Blume Bijdr. 741 (1826). Succulent herb, 20 in. tall. *Leaves* 1 to 3 in long, .5 to 1 in. wide; glabrous or nearly so, ovate-acuminate; petiole .5 in. long or less. *Racemes* lax, about 6 in. long; flowers numerous, pale to deep violet; bracteoles filiform, .1 to .2 in. long. *Calyx* tubular, .25 in. long, enlarged in fruit; lobes triangular or lanceolate. *Corolla* .6 in. long; lower lip several times longer than the upper one, subtrilobed. *Capsule* ellipsoid, .3 in. long. DC. Prodr. IX. 274; Clarke in DC. Monog. Phan. V. 161, in Comm. & Cyrt. Beng. t. 88, and in Hook. f. Fl. Br. Ind. IV. 367; Ridley in Journ. Str. Br. R. As. Soc. No. 43, 79. *R. Blumei*, DC. Prodr. IX. 274. *Wulfenia intermedia*, Wall. Cat. 408. *Loxotis intermedia*, Benth. Scroph. Ind. 57; G. Don Gen. Syst. Diehl. Pl. IV. 664. *L. obliqua*, R. Br. in Benn. Pl. Jav. Rar. 102, t. 24; Miq. Fl. Ind. Bat. II. 731, t. 35, fig. 3.

PERAK: Larut Hills, Fox; Batang Padang, Wray 1447, at 2000 ft. elevation.—*DISTRIB.* Tenasserim and Malay Islands.

15. EPITHEMA, Blume.

Small rock-herbs, succulent, pubescent; stems simple or branched. *Leaves* few, alternate or opposite above, petioled or sessile; ovate, usually cordate. *Peduncles* long, from the upper axils, erect; bract

single, ovate or cucullate; flowers small, blue or white, in a scorpioid cyme on short pedicels. *Calyx* campanulate; lobes 5, acute. *Corolla*-tube short; limb distinctly 2-lipped; lobes acute or obtuse, subequal. *Stamens*: 2 posterior perfect, 2 anterior ones sterile, shorter; anthers coherent. *Disk* unilateral or almost surrounding the ovary. *Ovary* ovoid; style longer; stigma subcapitate. *Capsule* globose, enclosed in the enlarged calyx on a thickened and a longer pedicel, splitting transversely (a. pyxis). *Seeds* ellipsoid or oblong, spirally reticulate.—**DISTRIB.** Species about 6 Asiatic, all very closely allied, and one African.

EPITHEMA SAXATILE, Blume Bijdr. 738 (1826). Succulent herb, 3 to 12 in. tall; stem viscid, pubescent. *Leaves* very variable, opposite, ovate cordate, denticulate or crenulate, hairy; 1.5 to 6 in. long, 1 to 5 in. across; petiole .25 to 1.5 in. long. *Peduncle* 1 to 2 in. long, viscid; cyme .75 in. across, subtended by a broad sessile truncate denticulate bract; flowers numerous, subsessile. *Calyx* viscid, pubescent, tubular, split about half-way down into 5 narrow lobes .25 in. long. *Corolla*-tube as long, straight, white; three upper lobes oblong, obtuse, tipped with violet; lower two connate, broader, subovate, denticulate, thinner, pellucid, tipped mauve with darker central spots; mouth of tube inside hairy. *Stamens* 4, in 2 pairs; filaments incurved, adnate to the mouth of the tube, white; anthers 2, oblong, connate, yellowish. *Ovary* ovoid, enclosed in a fleshy truncate yellow disk; style stout, glabrous; stigma capitate. *Capsule* globose, pubescent, surrounded by the much enlarged ovate acute sepals and borne on the thickened elongate to .125 in. pedicel, circumsciss. *Seeds* very numerous, brown, elliptic, fusiform, spirally ribbed. DC. Prodr. IX. 278; Miq. Fl. Ind. Bat. II. 736; Zoll. Verz. Ind. Archip. 55; Clarke in DC. Monog. Phan. V. 178; Ridley in Journ. Str. Br. R. As. Soc. No. 43, 80.

KEDAH: Langkawi Islands, *Curtis* 2107. **PERAK**: Telor Pinang Ipoh, *Ridley*; Batu Kuran, *Scortechini* 1580; *King's Collector* 10941; Sungei Ryah, *Kunstler* 283; Goping, *King's Collector* 5872. **SELANGOR**: Kuala Lumpur Caves, *Ridley* 8217. **PAHANG**: Kota Glanggi, *Ridley*.—**DISTRIB.** Java, Borneo, Sumatra. On limestone rocks.

16. MONOPHYLLÆA, R. Br.

Succulent herbs with an unbranched stem and one large herbaceous cordate-ovate sessile leaf. *Peduncles* numerous, from the leaf-base, with racemose or cymose inflorescence; flowers small. *Calyx* deeply 5-cleft; lobes elliptic, obtuse. *Corolla* small, usually white; tube short, cylindrical; limb distinctly 2-lipped, lobes 5. *Stamens* 4 perfect; filaments

short; anthers cohering in pairs or altogether. *Disk* unilateral or a complete ring. *Ovary* 1-locular; style short; stigma capitate. *Capsule* membranous, enclosed in the enlarged calyx, irregularly splitting. *Seeds* oblong, minute, reticulate.—**DISTRIB.** Species 7, of the Malay Peninsula and Islands, and Siam.

Leaf glabrous; calyx-lobes not spreading in fruit

Calyx-lobes ovate, rounded; flowers white .. 1. *M. Horsfieldii*.

Calyx-lobes lanceolate, acute; flowers white and brown .. 2. *M. glabra*.

Leaf strigosely hairy; calyx-lobes spreading in fruit .. 3. *M. patens*.

1. *MONOPHYLLÆA HORSFIELDII*, R. Br. in Benn. Pl. Jav. Rar. 121 (1840), and Ann. Sc. Nat. 2, XIII. 160. *Stem* 6 in. to 1 ft. tall. *Leaf* ovate-cordate, 6 to 12 in. long, 1 to 12 in. wide; glabrous, glaucous beneath. *Racemes* 2 to 7, often stout, 9 in. long; flowers numerous, subsecund; pedicels .25 in. long, glabrous. *Calyx*-lobes glabrous, rounded, ovate, ribbed. *Corolla*-tube short, cylindric; upper lip 2-lobed, lower 3-lobed; lobes rounded, white. *Stamens* 4, didynamous, glabrous; anthers connate. *Style* short, glabrous; pistil subglobose. *Capsule* globose, enclosed in the enlarged calyx-lobes. *Seeds* oblong, brown, reticulate, very numerous. DC. Prodr. IX. 274; Miq. Fl. Ind. Bat. II. 731; Clarke in DC. Monog. Phan. V. 182, and in Hook. f. Fl. Br. Ind. IV. 370; Ridley in Journ. Str. Br. R. As. Soc. No. 43, 82.

SELANGOR: Kuala Lumpur Caves, *Curtis*; *Beccari*. PERAK: Goping, *King's Collector* 443, 515.—**DISTRIB.** Sumatra: Batu Pantih (*Forbes* 2660); Java (*Lobb*). On limestone rocks.

2. *MONOPHYLLÆA GLABRA*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 82 (1905). *Stem* succulent, 6 in. to 1 ft. tall. *Leaf* ovate-cordate, obtuse, glabrous; glaucous beneath; 2.5 to 6 in. long, 2 to 6 in. wide. *Racemes* slender, glabrous, 4 to 10, 2 to 8 in. long, lax; flowers numerous, in pairs; pedicels slender, .25 in. long, spreading, deflexed. *Calyx*-lobes .125 in. long in fruit, lanceolate, acute, glabrous, not spreading. *Corolla* brown and white. *Capsule* enclosed in the sepals, cylindric, oblong.

SIAMESE STATES: Kasúm, *Curtis* 3219.

3. *MONOPHYLLÆA PATENS*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 82 (1905). *Stem* 1 to 4 in. long, viscid-hairy. *Leaf* ovate-cordate to ovate-lanceolate, strigose, hairy; 6 in. long, 4 to 6 in. across. *Racemes* slender, 4 to 20, pubescent, 4 to 5 in. long; flowers in pairs; pedicels slender, pubescent, .25 in. long in fruit. *Calyx*-lobes lanceolate, hairy, spreading in a stellate manner in fruit, ribbed. *Corolla*-tube short; lobes white. *Stamens* 4, glabrous, didy-

namous. *Ovary* ovoid ; style short, thick, glabrous. *Capsule* globose, glabrous. *Seeds* numerous, black, tessellated.

SELANGOR: Kuala Lumpur Caves, *Ridley* 8222; *King's Collector* 7052. PERAK: Kinta, *Curtis* 3136; Sungei Siput, *Curtis* 3135; Batu Kuran, *Scortechini* 1574, 1579; Goping, *Kunstler* 449. On limestone rocks.

17. STAURANTHERA, Benth.

Herbs, succulent, pubescent. *Leaves* alternate, the opposite ones reduced, falcate, elliptic, acuminate, inæquilateral. *Cymes* peduncled, lax; bracts small; flowers medium-sized, showy. *Calyx* campanulate; lobes 5. *Corolla* campanulate, rounded; tube short, shortly spurred or gibbous; limb 2-lipped; lobes rounded, nearly equal. *Stamens* 4 perfect; anthers connate, bilocular, bases diverging. *Ovary* subglobose or ovoid, no disk; style short. *Capsule* depressed, globose, irregularly split. *Seeds* minute, obovoid-reticulate.—DISTRIB. Species 3. Assam and Malay Islands.

Flowers large, base of corolla spurred ..	..	..	1. <i>S. grandiflora</i> .
Flowers small, base of corolla not spurred ..	..	..	2. <i>S. umbrosa</i> .

1. STAURANTHERA GRANDIFLORA, Benth. Scroph. Ind. 57 (1835). Succulent herb with a fleshy stem about 6 in. tall. *Leaves* 6 in. long by 4 in. wide or less; oblong, obtuse, crenulate; deep green above, bullate, glabrous, inæquilateral, pubescent on both sides; petiole 1 in. long. *Cyme* short, pubescent, 3 in. long, with a few (9) large flowers; bracts short, ovate; flowers 1.25 in. across. *Calyx*-lobes lanceolate, ovate, pubescent. *Corolla*-tube short and broad, with a short spur at the base; lobes short, broad, rounded, violet with a central yellow bar reaching to the spur. *Stamens* subequal, 4; filaments slender; anthers connate. *Ovary* ovoid; style shorter than the stamens; stigma capitate. *Capsule* 2 in. broad. Clarke in DC. Monog. Phan. V. 190, and in Hook. f. Fl. Br. Ind. IV. 371; G. Don Gen. Syst. Dichl. Pl. IV. 665. *S. grandifolia*, Dietr. Syn. Pl. III. 582; R. Br. in Benn. Pl. Jav. Rar. 121, and Ann. Sc. Nat. 2, XIII. 167; DC. Prodr. IX. 278; Hook. Bot. Mag. t. 5409; Floral Mag. Ser 1 (1866), t. 272; Miq. Fl. Ind. Bat. II. 735; Clarke Comm. & Cyrt. Beng. t. 89 bis; Ridley in Journ. Str. Br. R. As. Soc. No. 43, 83. *Glossanthus* ? *grandiflora*, Benth. in Wall. Cat. 6395.

PENANG: *Wallich* 6395; rocks near Balik Pulau, *Curtis*. PERAK: Larút, *King's Collector* 2248.—DISTRIB. Burma. Rare, on rocks.

2. STAURANTHERA UMBROSA, Clarke in Comm. & Cyrt. Beng. t. 89 (1874). Stem 3 to 6 in. tall. *Leaves* ovate, oblong, falcate, inæquilateral, strigosely hairy especially beneath; 6 to 8 in. long, 2 to 4

in. wide. *Cymes* spreading, few- to 10-flowered; peduncles and pedicels hairy. *Calyx* shortly 5-lobed, cup-shaped; lobes triangular, .25 in. long in flower, larger and spreading in fruit. *Corolla* .5 in. long, white with a violet spot in the centre. *Ovary* unilocular. *Capsule* circumsciss near the base. Clarke in DC. Monog. Phan. V. 189, and in Hook. f. Fl. Br. Ind. IV. 731; Ridley in Journ. Str. Br. R. As. Soc. No. 43, 83. *Cyananthus umbrosa*, Griff. Notul. IV. 154; Ic. Pl. Asiat. t. 437.

PERAK: Telok Pinang, near Ipoh, *Ridley* 9773; Kinta, *King's Collector* 7144. SELANGOR: woods at the Kuala Lumpur Caves, *Ridley* 8224. PAHANG: Tahan Woods, *Ridley* 2183. JOHORE: Gunong Panti, *Ridley* 4166.—DISTRIB. Assam. A ground plant in damp rocky woods.

18. RHYNCHOTECUM, Blume.

Shrubs, little branched, young parts red-woolly. *Leaves* opposite or alternate. *Cymes* axillary, decompound; flowers small, numerous. *Calyx* 5-cleft nearly to the base; lobes narrow. *Corolla* small, campanulate; limb 2-lipped; lobes 5, ovate or oblong, subequal. *Stamens* 4 perfect, affixed to near the corolla base; filaments short, curved; anther-cells 2, subparallel. *Ovary* sessile, ovoid; disk very small, annular or absent; style much longer than ovary; stigma subcapitate. *Berry* small, globose, with persistent style; pericarp pulpy. *Seeds* very small, smooth.—DISTRIB. Species 9, Indo-Malayan.

RHYNCHOTECUM PARVIFLORUM, Blume Bijdr. 775 (1826). A little-branched shrub about 3 ft. tall, leafy above, upper parts ferruginous-hairy. *Leaves* opposite, lanceolate, acute, cuneate at the base, serrate; 8 in. long, 3.5 in. wide; dark green, glabrous above except the midrib, covered with red wool beneath, thickest on the nerves; nerves 13 pairs; petiole 1 in. long. *Cymes* numerous, short, from the lower part of the stem, laxly branched, red-woolly; flowers very small, yellowish-white. *Calyx*-lobes nearly free to the base, linear-lanceolate, acute, woolly, .125 in. long. *Corolla* little longer than the calyx-lobes, campanulate; lobes oblong, obtuse, white. *Stamens* 4, very short; filaments short and thick. *Style* longer than the ovary. *Capsule* ovoid-globose, hairy, shorter than the sepals. G. Don Gen. Syst. Dichl. Pl. IV. 663; Dietr. Syn. Pl. III. 581; DC. Prodr. IX. 285; Zoll. Verz. Ind. Archip. (1854) 55; Miq. Fl. Ind. Bat. II. 750; Clarke in DC. Monog. Phan. V. i. 195, and in Hook. f. Fl. Br. Ind. IV. 373; Ridley in Journ. Linn. Soc. XXXII. 523, and in Journ. Str. Br. R. As. Soc. No. 43, 84. *Isanthera parviflora*, Ridley in Trans. Linn. Soc. Ser. 2, III. 331.

PENANG: Wallich; Pulau Betong and Penara Bukit, *Curtis* 3035;

PERAK : Larit Hills, *Ridley*; *King's Collector* 2237; *Scortechini* 1222.
 PAHANG : Kuala Tahan, *Ridley* 2171.—DISTRIB. Java, Sumatra.

19. CYRTANDROMÆA, Zoll.

Shrubs with square stems, leafy above. *Leaves* opposite, subequal, herbaceous, ovate elliptic or lanceolate, serrate, petioled. *Flowers* 1 to many, in axillary or basal cymes; bracts 2 in the middle of the pedicel. *Calyx* tubular, shortly 5-toothed or lobed, enlarged in fruit, usually red. *Corolla* large, white, tubular, thin, glabrous; tube dilated at apex; lobes rounded, subequal. *Stamens* 4 perfect, in 2 pairs, subsimilar; filaments linear; anthers ovoid, small. *Pistil* longer than stamens; stigma cup-shaped. *Capsule* globose or oblong, enclosed in the enlarged calyx, opening irregularly; walls membranous. *Seeds* numerous, sinuate, oblong, obtuse, ribbed, reticulate.—DISTRIB. Species 10, Malayan.

Flowers solitary, axillary; corolla nearly 1 in. long ..	..	1. <i>C. acuminata</i> .
Flowers in lax many-flowered cymes :—		
Cymes slightly supra-axillary; corolla about 2 in. long ..	..	2. <i>C. megaphylla</i> .
Cymes borne on base of stem or on upper portion below the leaves; corolla 1 in. long ..	.. .. .	3. <i>C. grandis</i> .

1. CYRTANDROMÆA ACUMINATA, Benth. and Hook. f. Gen. Pl. II. 1020 (1876). A shrubby plant, 3 to 4 ft. long; stem rather weak, hollow, young parts pubescent. *Leaves* lanceolate or ovate, narrowed into the petiole, acute, serrate, strigose, pubescent above, also on the nerves beneath; 4 to 6 in. long, 2 to 3 in. wide; petiole 1 in. long. *Flowers* solitary, axillary, on short .125 in. long, lanceolate, slender, hispid peduncles with 2 very small linear bracts in the middle. *Calyx* tubular, .5 in. long, glabrous, with short teeth, dull red. *Corolla* nearly straight, 1 in. long; tube thick; lobes rounded, white. *Capsule* oblong, 4-angled, .25 in. long. *Seeds* minute, deeply reticulate. Clarke in DC. Monog. Phan. V. i. 185, and in Hook. f. Fl. Br. Ind. IV. 370; *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 86. *Cyrtandra?* *acuminata*, Wall. Cat. 1808. *Busea subsessilis*, Miq. Fl. Ind. Bat. II. 733.

TRINGGANU : Bundi, *Rostado*; PENANG : *Porter* in *Wallich's Collector*, 808; *Maingay* (K.D.) 1232-2; *King*; *Tonoh*, *Machado*. PERAK : Larit Hills, *Ridley* 2917; *Scortechini* 83, 329; *King's Collector* 5342, 2139. SELANGOR : Ginting Bidai, *Ridley*. NEGRI SEMBILAN : Bukit Sulu, *Cantley*.

2. CYRTANDROMÆA MEGAPHYLLA, Hemsley in Hook. Ic. Pl. t. 1555 (1884). Herb about 3 ft. tall; stem bluntly 4-angled, pithy in the centre, pubescent. *Leaves* opposite, subequal, herbaceous, ovate,

acutely acuminate, coarsely serrate, base rounded or subcordate; 6 to 10 in. long, 3 in. wide; pubescent; petiole 3 to 5 in. long. *Cymes* from a little above the axils, lax, many-flowered. *Calyx* tubular, pubescent, shortly 5-toothed, .5 in. long, inflated in fruit. *Corolla* about 2 in. long, white, obliquely infundibuliform; lobes rounded, subequal. *Ovary* perfectly bilocular. Ridley in Journ. Linn. Soc. XXXII. 523, and in Journ. Str. Br. R. As. Soc. No. 43, 86.

PERAK: Larut Hills at 2100 ft. alt., Wray; *Scortechini* 584; Gunong Batu Putih, *King's Collector* 8155. SELANGOR: Ginting Peras, *Ridley* 7602.

3. *CYRTANDROMŒA GRANDIS*, Ridley in Journ. Str. Br. R. As. Soc. No. 43, 87 (1905). A large shrub, several feet tall; base of stem woody, .5 in. through, glabrous. *Leaves* opposite, equal, herbaceous, lanceolate acuminate, glabrous, narrowly acuminate at the base; margins dentate; 12 in. long, 4 in. wide; nerves elevated, 10 pairs; petiole 1 to 1.25 in. long. *Cymes* large, lax, borne on the base of the stem, and on the upper part below the leaves, many-flowered, 2.5 to 6 in. long, pubescent; pedicels .25 in. long. *Calyx* tubular, pubescent, with linear lobes, red, .5 in. long. *Corolla* white, 1 in. long; tube straight, thick; lobes rounded. *Capsule* globose, .5 in. long, enclosed in the enlarged calyx. *Seeds* minute, black, oblong, ribbed and reticulate.

PERAK: Ulu Bubong, *King's Collector* 10150; Gunong Batu Putih, *King's Collector* 8155. SELANGOR: Kuala Lumpur, *Curtis*; *Ridley* 10498; 15th mile Pahang Track, *Ridley* 8552; Bukit Hitam, *Ridley* 7576.

20. *CYRTANDRA*, Forst.

Half-shrubby plants, terrestrial or rarely epiphytic; stems often branched, usually tall. *Leaves* opposite, subequal or one smaller. *Cymes* axillary, on long or short peduncles, many-flowered; bracts large or small, free or connate; bracteoles ovate or narrowed or absent. *Calyx* tubular, 2- to 6-lobed, usually 5-lobed; lobes lanceolate. *Corolla*-tube short, usually pubescent, infundibular, straight; lobes 5, subequal or more or less distinctly 2-lipped, usually white-spotted or marked with yellow-brown or red. *Stamens* 2, perfect, shortly exsert or included, affixed to the corolla; anthers bilocular, connivent, free or coherent; staminodes small, 2 to 3. *Disk* annular or unilateral. *Ovary* ovoid or oblong; style long, filiform; stigma sub-bilobed. *Berry* sausage-shaped or ovoid, firmly fleshy, usually beaked with the persistent style. *Seeds* numerous, minute, ellipsoid, smooth or obscurely reticulate.—DISTRIB. About 170 species, in the Malay Peninsula and Archipelago eastwards to Polynesia.

Bracts free :—

Leaves of a pair with one usually manifestly smaller than the other, sometimes entirely suppressed, or less frequently (*C. pendula*) reduced to a subulate process opposite the perfect leaf :—

Leaves 12 in. long, their margins strongly toothed especially towards the apex, all quite alternate from suppression of one of each pair; calyx 5-lobed; corolla .5 in. long 1. *C. dispar*.

Leaves 7 to 9 in. long, their margins entire or occasionally (*C. pendula* sometimes) crenate :—

Bracts ovate acute; leaves with one of each pair usually smaller than the other and sometimes (*C. falcata* often) suppressed entirely; leaf-margins always entire; calyx 5-lobed :—

Bracts 1 in. long; leaves 7 to 9 in. long, main nerves about 12 pairs, prominent, both leaves of each pair always present and the two sometimes subequal; corolla over 1 in. long 2. *C. suffruticosa*.

Bracts .5 in. long; leaves 7 to 8 in. long; main nerves about 10 pairs, not prominent, one leaf of each pair always smaller than the other and sometimes entirely suppressed; corolla unknown 3. *C. falcata*.

Bracts lanceolate-acuminate; leaves 8 in. long, with one of each pair reduced to a subulate process; margins entire or sometimes crenate; calyx 2-fid; corolla 1.5 in. long 6. *C. pendula*.

Leaves of a pair always subequal :—

Margins of leaves serrate; calyx .5 in. long, 2-fid; corolla 1 in. long 4. *C. pilosa*.

Margins of leaves crenate; calyx 1.5 in. long, 3-fid; corolla 1.5 in. long 5. *C. lanceolata*.

Bracts connate in a large white cup; leaves of a pair always subequal 7. *C. cupulata*.

1. *CYRTANDRA DISPAR*, DC. Prodr. IX. 282 (1845). Shrub with a stout, pale, reticulate, fistular stem; obscurely 4-angled. *Leaves* alternate, obovate oblanceolate, inæquilateral, petioled; strongly toothed, especially at the apex; glabrous above, red-pubescent beneath; 12 in. long, 4 in. wide; petiole 1 in. long. *Flowers* small, very numerous, in axillary cymes; pedicels .25 in. long, hispid. *Calyx* persistent, cup-shaped, with 5 lanceolate, acuminate, hairy lobes. *Corolla* white, .5 in. long; tube dilated upwards, hairy outside; lobes short, obtuse, rounded. *Stamens* shorter than the tube; abortive ones very much reduced. *Pistil* hairy. *Berry* .25 in. long, oblong, ellipsoid, hairy. Miq. Fl. Ind. Bat. II. 742; Clarke in DC. Monog. Phan. V. i. 203, t. 23, and in Hook. f. Fl. Br. Ind. IV. 375; Ridley in Journ. Str. Br. R. As. Soc. No. 43, 88. *C. frutescens*, Wall. Cat. 807 partly, not of Jack.

PENANG: Government Hill, *Curtis* 1204; *Wallich* 807; (part); 1000

Maingay (K.D.) 1232. PERAK: Bujong Malacca, *Ridley* 9703; Larit Hills, *Ridley* and *Fox*, *Scortechini* 367, 1231; *Wray* 2196; *King's Collector* 2052, 5131, 3891.—DISTRIB. Sumatra.

2. *CYRTANDRA SUFFRUTICOSA*, *Ridley* in Trans. Linn. Soc. Ser. 2, III. 330 (1893). A large shrub, 4 ft. tall, with hollow 4-angled pale stems .25 in. thick. *Leaves* opposite, one of each pair often very much smaller alternately on one side or the other; lanceolate, abruptly acuminate, subfalcate, inæquilateral; edges entire; nerves conspicuous, about 12 pairs; glabrous when adult, young leaves and petioles red-pubescent; 7 to 9 in. long, 2.5 to 3 in. wide; petiole .5 to .75 in. long. *Peduncles* short and thick, axillary; bracts free, ovate acute, pubescent, 1 in. long, .5 in. across; flowers about 6 in a head, nearly sessile. *Calyx* deciduous; sepals linear. *Corolla* glabrous, over 1 in. long; base cylindric, dilated upwards; lobes rounded, obtuse, white with brown streaks in the throat. *Anthers* large, elliptic. *Style* pubescent. *Berry* .75 in. long, sausage-shaped. *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 89.

PERAK: *Scortechini* 142; *Gopeng*, *King's Collector* 4720; Kota Bahru, *King's Collector* 569; *Tupai*, *Larut*, *Wray* 2845. JOHORE: *Tengarah*, *Fielding*; *Pulau Tiunan*, *Ridley*. On rocks.

Ridley says it is nearly allied to a Bornean species, *C. oblongifolia*, *Clarke*, but much larger in all parts. It is generally found growing on rocks or (*King's Collector* 4720) from the top of a high tree. *Wray* describes the flowers as "white marked in the throat with dark claret: bracts green without, claret within; fruit light green, finely spotted, paler."

3. *CYRTANDRA FALCATA*, *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 89 (1905). Epiphytic shrub, about 2 ft. tall; stem quadrangular, fistulose, pale. *Leaves* lanceolate acuminate, falcate; alternate, often with small opposite ones; glabrous when adult; narrowed at the base into the petiole; nerves about 10 pairs; 7 or 8 in. long, 1.5 in. wide; petiole 1 in. long, pubescent. *Cymes* axillary, .125 in. shortly peduncled; bracts broadly ovate, acute, pubescent, .5 in. long; flowers few, shortly pedicelled. *Fruit* fusiform, .5 in. long.

PERAK: *Wray* 2845; *Scortechini* 142. SELANGOR: woods round the Kuala Lumpur Caves, *Ridley* 8219.

Allied to *C. oblongifolia*, *Hook. f.*, and *C. suffruticosa*, *Ridley*, but the leaves are much narrower than those of the latter, and thinner and with more conspicuous nerves than those of the former.

4. *CYRTANDRA PILOSA*, *Blume* Bijdr. 770 (1826). Shrub with stout 4-angled hollow stems as much as .5 in. through, 3 ft. tall, upper parts pubescent. *Leaves* opposite, obovate, narrowed into a winged petiole; margins serrate; above more or less covered with pale hairs from a

swollen base, in old leaves often glabrescent, beneath covered with red hairs on the nerves; nerves prominent 10 to 12 pairs; 8 to 18 in. long, 3 to 4 in. wide. *Cymes* small, nearly sessile, axillary; bracts ovate or lanceolate acuminate, hairy, 1 in. long. *Calyx* tubular, hairy, .5 in. long, bifid. *Corolla* white, 1 in. long, silky-hairy; tube infundibuliform, stout; upper lobes oblong obtuse, lower two connate, shortly bifid, obtuse, punctate above. *Stamens* little longer than the tube; filaments glabrous; abortive stamens short. *Fruit* ovoid, conic, acute, brown, reticulate-tessellate, .5 to .75 in. long. G. Don Gen. Syst. IV. 661; DC. Prodr. IX. 282; Miq. Fl. Ind. Bat. II. 742; Zoll. Verz. Ind. Archip. 55; Clarke in DC. Monog. Phan. V. i. 231, and in Hook. f. Fl. Br. Ind. IV. 375; Ridley in Journ. Str. Br. R. As. Soc. No. 43, 90. *C. decurrens*, De Vriese Pl. Ind. Bat. Reinw. 14; Miq. l.c. 746; Clarke l.c. 231, 375.

PENANG: Penara Bukit, Wallich 807, on banks in forests. PERAK: Larut Hills, Ridley 2915; Curtis 2897; *Scortechini* 354, 270; King's Collector 5588. SELANGOR: Bukit Kutu, Ridley 7574, Bukit Hitam, Pahang Track, 8560, 8554. NEGRI SEMBILAN: Bukit Tanga, Napier; Bukit Sulu, Cantley. JOHORE: Gunong Pant, Ridley; Bukit Tanah Abang, Kelsall.—DISTRIB. Tenasserim to New Guinea. In rocky woods up to about 2000 ft. altitude.

Ridley says he is unable to separate specifically the forms described respectively under the names of *C. pilosa*, Bl., and *C. decurrens*, De Vr., at least as far as applies to the variety *Wallichii* of the latter. The main distinction seems to be in the amount of hairiness of the leaves, in which point the plant seems very variable.

5. CYRTANDRA LANCEOLATA, Ridley in Journ. Linn. Soc. XXXII. 527 (1895). *Stem* about 1 ft. tall, quadrangular, upper part pubescent, the base bare. *Leaves* oblanceolate acute, narrowed at the base, crenulate, almost entirely glabrous; 12 in. long, 4 in. wide. *Cymes* at the base of the stem below the leaves very shortly peduncled, lax, many-flowered; pedicels .75 in. long, hispid; bracts lanceolate, small, hispid. *Calyx* 1.5 in. long, tubular, hispid; lobes 3, linear-acuminate. *Corolla* 1.5 in. long, dilated above, pubescent, white, throat yellow. *Anthers* long, narrowed above. *Style* 1 in. long, pubescent; stigma bilobed; lobes oblong, linear. Ridley in Journ. Str. Br. R. As. Soc. No. 43, 91.

JOHORE: Gunong Pant, Ridley.

6. CYRTANDRA PENDULA, Blume Bijdr. 768 (1826). *Stem* 1 or 2 ft. tall. *Leaves* alternate, ovate cordate or lanceolate, entire or crenate; dark green and glabrous above, often barred with white and covered with reddish tomentum beneath; 8 in. long, 4 to 6 in. wide; petiole 3 to 6 in. long, opposite leaf in each internode reduced to a subulate process

Capitulum of 20 flowers on peduncles 4 in. long, decurved, appressed-hairy; bracts lanceolate, acuminate, hairy; flowers shortly pedicelled. *Calyx*-tube .5 in. long, thin, shortly bifid. *Corolla*-tube 1.5 in. long; base narrow, curved, ventricose upwards, cream-coloured or pale yellow, hairy; upper lip of two rounded lobes, lower of three broader oblong rounded ones, all creamy white or pale yellow with purple spots in the mouth and tube. *Stamens* 2, glabrous; filaments purplish, sinuate; anthers oblong, connivent. *Style* stout, white; stigma transversely oblong. *Fruit* sausage-shaped, .5 in. long. G. Don Gen. Syst. Diehl. Pl. IV. 660; DC. Prodr. IX. 281; Miq. Fl. Ind. Bat. II. 739; Hook. Ic. Pl. t. 736; Clarke in DC. Monog. Phan. V. i. 242; Ridley in Journ. Str. Br. R. As. Soc. No. 43, 91. *C. bicolor*, Jack in Trans. Linn. Soc. XIV. 27; DC. l.c.; Clarke in Hook. f. Fl. Br. Ind. IV. 375; Miq. l.c.

PERAK: Larút Hills, *Curtis* 2036; *Scortechini* 142 and 254; *Wray* 2845; Ulu Bera, *King's Collector* 10810. SELANGOR: Kuala Lumpur, Bukit Hitam, *Ridley*. SUNGEI UJONG: Bukit Sulu, *Cantley*. MALACCA: *Maingay*. PAHANG: Kuala Tembeling, *Ridley*. JOHORE: Gunong Panti, Pulau Tioman. SINGAPORE: Bukit Timah, *Ridley* 2703; *King*.—DISTRIB. Java and Sumatra.

7. *CYRTANDRA CUPULATA*, *Ridley* in Journ. Linn. Soc. XXXII. 527 (1895). A shrubby plant 2 or 3 ft. tall; stem terete or more or less 4-angled above, covered with red hair. *Leaves* opposite, equal, very variable, oblanceolate with an acuminate base, serrately toothed; scantily hairy above, more hairy beneath; petiole sometimes winged to the base, villous, 1 in. long; blade 12 in. long, 4 in. wide. *Peduncles* .5 in. long, axillary in pairs, villous; bracts connate in a white hairy cup 1 in. long; bracteoles short, lanceolate, acute, white; flowers numerous, opening singly, little longer than the bract. *Corolla* 1 in. long, curved, infundibuliform, 2-lipped, pubescent, white, yellow and brown in the mouth; lobes 5 subequal, ovate, obtuse. *Stamens* included, 2. *Pistil* short; ovary oblong, with a terminal tuft of hair; style short, curved; stigma clavate, bilobed. *Fruit* .5 in. long, fusiform. *Ridley* in Journ. Str. Br. R. As. Soc. No. 43, 92.

PERAK: Tapa, *Wray* 1389 and 191; Ulu Bubong, *King's Collector* 10250; Larút Hills, *Scortechini* 366; Chandleriang, *King's Collector* 5833, in wet woods. MALACCA: lower slopes of Mount Ophir, *Ridley* 7575; Sungei Buluh, *Ridley* 10550. PAHANG: Tahan Woods, *Ridley* 2150.

Family XC.—VERBENACEÆ.

Herbs, shrubs or trees. *Leaves* opposite or verticillate (apparently alternate in *Geunsia*), simple, digitate or pinnate (*Peronema*); stipules none. *Inflorescence* cymose, racemose or spicate, often in panicles; bracts usually small, sometimes leafy; flowers hermaphrodite or sometimes polygamous, generally irregular, often brightly coloured, sometimes with coloured calyx or enlarged coloured involucre. *Calyx* inferior, gamosepalous, 5- to 4- (rarely 6- to 8-) lobed, often accrescent. *Corolla* gamopetalous; tube usually cylindric or dilated above, often curved; limb 2-lipped or subequally lobed; lobes 4 or 5, rarely more. *Stamens* usually 4 didynamous, sometimes 2, sometimes 5. 6 or more, inserted on the corolla-tube; filaments free; anthers 2-celled, opening longitudinally. *Ovary* superior, sessile, 2- to 4-celled, entire or 4-lobed; ovules variously attached, 2 (sometimes 1) in each cell; style terminal; stigma entire or bifid at apex. *Fruit* drupaceous with bony pyrenes, or capsular, 1- to 4-celled; mesocarp usually fleshy; endocarp usually bony. *Seeds* erect or pendulous, separate in distinct cells; albumen usually none; embryo straight; radicle inferior.—DISTRIB. Tropical regions of both hemispheres, very few extending to temperate countries; species about 750.

Inflorescence spicate, centripetal (the lowest flowers opening first) (Tribe I. VERBENÆ):—

Shrubs or herbs with short spikes; calyx minute; stamens 4; anther-cells parallel:—

Fruit a drupe with fleshy mesocarp 1. LANTANA.

Fruit dry with thin granular mesocarp 2. LIPPIA.

Herbs with long spikes; calyx long, tubular; stamens 2; anther-cells divaricate 3. STACHYTARPHETA.

Inflorescence cymose, centrifugal (the end flowers opening first):—

Cymes paniculate; drupes fleshy (Tribe II. VITICÆ):—

Leaves simple:—

Corolla regular; stamens isomerous, equal:—

Flowers 5-merous; drupe with 5 to 10 pyrenes 4. GEUNZIA.

Flowers 4-merous; drupe with 4 pyrenes 5. CALLICARPA.

Flowers 4- to 6-merous; drupe with 14-celled endocarp, included in the accrescent calyx 6. TECTONA.

Corolla 2-lipped; stamens didynamous:—

Drupe with 1 pyrene:—

Flowers small 7. PREMNA.

Flowers large 8. GMEINA.

Drupe with 4 pyrenes (1 to 3 often suppressed) 9. CLERODENDRON.

Leaves digitate or in 1 species unifoliate; pyrene 1 10. VITEX.

Cymes paniculate; drupes capsular (Tribe III. CARYOPTERIDÆ):—

Leaves imparipinnate; fruit 4-celled; calyx not enlarged

in fruit; trees 11. PERONEMA.

Leaves 1- to 3-foliolate; fruit 2-celled; calyx much

enlarged in fruit; climbers 12. PETRÆOVITEX.

Cymes capitate; bracts of the flower-head usually large and involucriform; large climbers (Tribe IV. SYMPHOREMÆ):—

Involucral bracts 6; corolla-lobes subequal; stamens

included or exsert 13. SPHENODESMA.

Involucral bracts 4; corolla 2-lipped, the two lobes of

the upper lip the longest; stamens exsert 14. CONGEA.

Cymes densely capitate or in short spikes, centripetal;

flowers small; calyx-segments 5, much imbricate; trees or

shrubs (Tribe V. AVICENNIEÆ) 15. AVICENNIA.

HOLMSKIÖLDIA SANGUINEA, Retz Obs. VI. 31 (1791), is a straggling shrub of the Eastern subtropical Himalaya, with a large red obconic calyx and red flowers, often cultivated in gardens and occasionally found as an escape.

PENANG: on Government Hill, *Curtis* 2879.

DURANTA PLUMIERI, Jacq. Select. Stirp. Amer. 186, t. 176, fig. 76 (1763), is a blue-flowered shrub cultivated in gardens and sometimes found run wild in their neighbourhood.

SINGAPORE: *Ridley*.

Tribe I. VERBENÆ.

1. LANTANA, Linn.

Erect or scandent, often rambling, pubescent or scabrous shrubs, rarely herbs; branches usually tetragonal, sometimes prickly. *Leaves* simple, opposite or ternate, petiolate, incise-crenate, more or less rugose. *Flowers* in dense pedunculate spikes from the axils of the leaves, variable in colour; the spikes capitate, ovoid or cylindric; bracts conspicuous, persistent, ovate or lanceolate; bracteoles none. *Calyx* small, membranous, campanulate, truncate or 4- to 5-toothed. *Corolla* hypocrateriform; tube slender, cylindric; lobes 4 to 5, spreading, orbicular. *Stamens* 4 didynamous, included in the corolla-tube and inserted at its middle; anthers broadly oblong with parallel cells. *Ovary* 2-celled; ovule solitary in each cell, erect from the base or laterally attached close to the base; style short; stigma oblique or sublateral, thickened. *Fruit* a drupe with more or less fleshy mesocarp; endocarp hard, separating when ripe into two 1-celled, 1-seeded pyrenes. *Seed* exalbuminous; testa reticulate; radicle inferior.—**DISTRIB.** Species about 50, tropical or subtropical, mostly American, a few African or Asiatic.

Bracts lanceolate; without prickles	..	..	.. 1. <i>L. salvifolia</i> .
Bracts ovate, acuminate; with recurved prickles	..	..	.. 2. <i>L. aculeata</i> .

1. *LANTANA SALVIFOLIA*, Jacq. Hort. Schoenbr. III. 18, t. 285 (1798). An erect branching shrub, reaching 3 to 8 ft. in height; stems rough, without prickles; branchlets quadrangular, strigosely hispid, yellowish-brown. *Leaves* opposite or in whorls of 3, membranous when dry; ovate-lanceolate, acute at apex, suddenly narrowed and then decurrent at base; both surfaces rugose, the upper strigosely hispid, the lower villous and pale; margins crenate-serrate; 2 to 5 in. long, 1 to 2 in. broad; main nerves 8 to 12 pairs, the lowest pair opposite and more oblique than the others, all curving to the margin; reticulations prominent; petiole .2 to .4 in. long, winged by the decurrent margins of the blade. *Spikes* globose to oblong, .5 to 1 and even 1.5 in. long, gradually elongating as the fruit ripens; peduncles angular, hispid, 1 to 3 in. long; bracts ovate, caudate-acuminate, strigosely villous, .25 in. long. *Calyx* minute, truncate, densely villous. *Corolla*-tube curved, slightly inflated opposite the stamens, villous without, .2 in. long; lobes spreading, rounded, the uppermost slightly acute. *Filaments* short; anther-cells equal. *Drupe* oblong, purple: exocarp thin, hispid; mesocarp fleshy; endocarp rugose, the 2 pyriform pyrenes of which it is composed closely adherent. *Seed* elliptic; testa reticulate; cotyledons thin. Baker in Dyer Fl. Trop. Afr. V. 276; Schauer in DC. Prodr. XI. 605. *L. indica*, Roxb. Hort. Beng. 46 (1814), and Fl. Ind. III. 89; Wall. Cat. 1823 A,B; Wight Ill. t. 173 b, fig. 3, and Ic. t. 1464; Trimen Fl. Ceyl. III. 346; Clarke in Hook. f. Fl. Br. Ind. IV. 562; Cooke Fl. Bomb. II. 418; Prain Beng. Plants 825. *L. dubia*, Wall. Cat. 1821, 2 and c, not 1; Royle Ill. 300 t. 73, fig. 2. *L. collina*, Dene. in Jacquem. Voy. Bot. 136, t. 141. *L. alba*, Schauer l.c. 606; Dalz. & Gibs. Bomb. Fl. 198; Brandis For. Fl. 369; Kurz For. Fl. II. 253; Boiss. Fl. Orient. IV. 532, not of Miller, Dene. or Link.

PENANG: *Ridley*; *Curtis* 121; *Deschamps*. PERAK: at Teluk Anson, *Ridley* 10762. MALACCA: *Ridley* 10115. SINGAPORE: *Deschamps*; *Kunstler* 135.—DISTRIB. India, Burma, Ceylon, Tropical and South Africa.

2. *LANTANA ACULEATA*, Linn. Sp. Pl. 627 (1753). A very straggling erect shrub with many branches, 4 to 8 ft. high; branchlets quadrangular, armed with recurved prickles. *Leaves* opposite; ovate, acute at apex, truncate or cordate at base; the blade decurrent; upper surface scabrous, lower pubescent; margins crenate, 1 to 3 in. long, 1 to 2 in. broad; midrib slender; main nerves 5 to 6 pairs, curving upwards to the margin; reticulations netted; petiole slender, .5 to .7 in. long, the upper part bordered by the decurrent margins of the blade. *Spikes*

globose, .25 to 1 in. in diam.; peduncles 1 to 1.5 in. long, hispid; bracts lanceolate, .25 in. long; flowers of various colours, orange, red, and white. *Calyx* very small, slightly 2-lipped, pubescent. *Corolla*-tube slender, pubescent, .2 to .4 in. long; lobes rounded, spreading. *Filaments* very short; anther-cells unequal. *Drupe* ovoid, black, shining, .1 to .2 in. in diam.; pyrenes rounded. Bot. Mag. t. 96; Dalz. & Gibs. Suppl. 68; Trimen Fl. Ceyl. III. 346. *L. Camara*, Linn. l. c.; Schauer in DC. Prodr. XI. 598; Hook. f. Fl. Br. Ind. IV. 562; Cooke Bomb. Fl. II. 419; Prain Beng. Plants 825; Baker in Dyer Fl. Trop. Afr. V. 275.

PENANG: *Curtis*; *Deschamps*. PROVINCE WELLESLEY: *G. King*. SINGAPORE: *Deschamps*.—DISTRIB. Native of Tropical America, now widely spread in many regions of the Old World and very troublesome from its quick and strong matted growth.

2. LIPPIA, Linn.

Shrubs or undershrubs, rarely herbs, usually more or less hairy. *Leaves* opposite, ternate or verticillate, rarely alternate; entire dentate or lobate. *Flowers* small, in elongate or cylindrical or capitulate spikes; bracts small, imbricate; bracteoles none. *Calyx* small, membranous, 2- to 4-lobed, ultimately 2-valved, enclosing or sometimes adhering to the fruit. *Corolla* more or less hypocrateriform; tube cylindrical, straight or curved; limb oblique, more or less bilabiate; upper lip bifid, emarginate or 2-lobed; lower lip 3-lobed. *Stamens* 4 didynamous, included in the corolla-tube and inserted at its middle; anthers ovate with parallel cells. *Ovary* 2-celled; ovule solitary in each cell, erect from the base or laterally attached near the base of the cell; style short; stigma capitate, oblique or recurved, thickened. *Fruit* small, with a dry epicarp; mesocarp granular; endocarp hard, bony, easily separating into two 1-seeded pyrenes. *Seed* exalbuminous; radicle inferior.—DISTRIB. About 100 or more species, chiefly Tropical American, with a few African and only very few Asiatic.

LIPPIA NODIFLORA, Michx. Fl. Bor. Amer. II. 15 (1803). A creeping perennial herb; stems rooting at the nodes, much branched, subquadrangular, channelled, more or less clothed with appressed, medifixed, white hairs, often glabrous. *Leaves* opposite, subsessile, spatulate, rounded at apex, cuneate at base; both surfaces appressedly hairy with medifixed white hairs; upper half deeply and sharply serrate, lower entire; .75 to 1.25 in. long, .25 to .75 in. broad; midrib prominent; main nerves 3 to 4 pairs, straight. *Spikes* dense, globose at first, afterwards gradually elongating to oblong in fruit, .25 to .5 in. long; peduncles 1 to 3 in. long, usually from only one axil of each pair

of leaves, slender, quadrangular, channelled; bracts much imbricate, variable, .1 to .2 in. long, lower broadly ovate, upper narrowly cuneate, all acuminate with more or less hyaline fimbriate margins; flowers small, pale blue, pink, or white. *Calyx* 2-lobed; lobes lanceolate, pubescent. *Corolla*-tube slender, .1 in. long; limb 2-lipped, lower lip 3-lobed, midlobe obtuse. *Stigma* capitate. *Fruit* .05 to .075 in. long, glabrous, ovoid; epicarp bony, membranous; mesocarp granular; endocarp separating in two plano-convex pyrenes. *Seed* elliptic; testa membranous; cotyledons fleshy. Schauer in DC. Prodr. XI. 585; Wight III. t. 173 b, fig. 2, and Ic. t. 1463; Dalz. & Gibs. Bomb. Fl. 198; Clarke in Hook. f. Fl. Br. Ind. IV. 563; Miq. Fl. Ind. Bat. II. 905; Trimen Fl. Ceyl. III. 347; Cooke Bomb. Fl. II. 420; Prain Beng. Plants 825; Baker in Dyer Fl. Trop. Afr. V. 279. *Verbena nodiflora*, Linn. Sp. Pl. 20; Burm. Fl. Ind. 12, t. 6, fig. 1; Roxb. Hort. Beng. 4. *Blairia nodiflora*, Gaertn. Fruct. I. 266, t. 56. *Zapania nodiflora*, Lamk. III. t. 17; Wall. Cat. 1824. *Latana sarmentosa* and *repens*, Spreng. Syst. II. 752. *Phyla chinensis*, Lour. Fl. Cochinch. 66.

PENANG: at Sangie Penang, Curtis 3520. PROVINCE WELLESLEY: Curtis 2208. SINGAPORE: *Kunstler* 1198, in grassy and sandy places near the coast.—DISTRIB. India, Malay Archipelago, Africa and most tropical and subtropical regions.

3. STACHYTARPHETA, Vahl.

Herbs or shrubs. *Leaves* usually opposite, toothed, usually rugose. *Flowers* in terminal spikes in the axils of bracts, the rachis often hollowed out beneath each flower; bracts lanceolate, long or short; bracteoles none. *Calyx* elongate, narrowly cylindrical, shortly 4- to 5-toothed, variously slit at a late stage. *Corolla* hypocrateriform; tube slender, cylindrical, usually curved; limb spreading, 5-lobed; the lobes equal or unequal, rounded. *Stamens* 2 perfect (the anticous ones), included in the corolla-tube, affixed above the middle; filaments short; anther-cells vertically divaricate; staminodes (posticous) 2 or 0. *Ovary* 2-celled; ovules solitary in each cell, attached laterally near its base; style long, filiform, exsert; stigma capitate. *Fruit* cylindrical, included in the calyx, separating into 2 bony 1-seeded pyrenes. *Seeds* oblong; testa membranous; albumen none; cotyledons fleshy; radicle inferior.—DISTRIB. About 40 species, mostly Tropical American, a few African; the Indo-Malayan species probably introduced and run wild.

Spikes usually slender, glabrous; flowers blue	..	..	1. <i>S. jamaicensis</i> .
Spikes usually stout, hairy; flowers pink	..	..	2. <i>S. mutabilis</i> .

1. STACHYTARPHETA JAMAICENSIS, Vahl Enum. I. 206 (1805). An 1008

annual erect branched herb, reaching 1 to 3 ft. high; stems dichotomously branched, nearly quadrangular. *Leaves* opposite, elliptic, obtuse or acute at apex, cuneate at base and decurrent, upper two-thirds coarsely serrate, lower cuneate portion entire; both surfaces glabrous or nearly so; 1 to 4 in. long, 1 to 1.5 in. broad; midrib slender; main nerves slender, 4 to 6 pairs, curved upwards; petiole obscure, being winged by the decurrent margins of the blade. *Spikes* elongate, 3 to 12 in. long, slender; rachis up to .15 in. in diam., conspicuously excavated to hold the flowers, the hollows closed by the bracts; bracts lanceolate, acuminate, scarious and ciliate on the margins, .15 to 2 in. long; flowers blue. *Calyx* .25 in. long, membranous, glabrous, 4- to 5-toothed, usually slit on one side (that in the hollow of the rachis). *Corolla*-tube curved outwards, .3 to .5 in. long; limb spreading, 5-lobed. *Fruit* dry, .15 in. long, tipped with the slender remains of the style; pyrenes plano-convex, very hard. Bot. Mag. t. 1860. *S. indica*, Vahl, *l. c.*; Clarke in Hook. f. Fl. Br. Ind. IV. 564; Trimen Fl. Ceyl. III. 348; Cooke Bomb. Fl. II. 421; Prain Beng. Plants, 826; Baker in Dyer Fl. Trop. Afr. V. 284. *S. urticifolia*, Dalz. & Gibs. Bomb. Fl. Suppl. 68. *Stachytarpha jamaicensis*, Schauer in DC. Prodr. XI. 564. *S. indica*, Schauer in DC. *l. c.*; Miq. Fl. Ind. Bat. II. 907. *Verbena jamaicensis*, Linn. Sp. Pl. 19; Roxb. Hort. Beng. 4. *V. indica*, Linn. Sp. Pl. ed. 3, 27; Wall. Cat. 2656.

PENANG: common by roadsides, *G. King*; on Government Hill, *Curtis*. PERAK: at Panjsore, *Scortechini* 996. JOHORE: *Marius, Jensen*. SINGAPORE: *Cuming* 2406; in waste places, *Deschamps*; *Kunstler (King's Collector)* 173, 1149.—DISTRIB. India, Ceylon, Malay Archipelago, Tropical Asia and Africa; in Malaya probably introduced and run wild.

2. *STACHYTARPHETA MUTABILIS*, Vahl Enum. I. 209 (1805). A stout branching pubescent herb, reaching 3 ft. high or more; stems quadrangular, densely tawny-pubescent. *Leaves* opposite, ovate acute at apex, rounded at base and decurrent; upper three-fourths broadly crenate, the crenatures mucronate, basal part entire; upper surface sparsely villous and scabrid, lower softly grey-tomentose; 3 to 5 in. long, 1.5 to 2.5 in. broad; midrib stout; main nerves 6 to 8 pairs; petiole 1.5 to 1 in. long, almost entirely bordered by the decurrent margins of the blade. *Spikes* stout, elongate, 6 to 18 in. long; rachis up to .25 in. in diam., excavated vertically to hold the flowers, the hollows closed by the bracts; bracts ovate-lanceolate, cuspidate-acuminate, strigosely hairy, .25 to .5 in. long; flowers pink. *Calyx* .4 to .5 in. long, strigosely pubescent, 4-toothed on the outer side, cleft on the inner, the teeth acute. *Corolla*-tube curved outwards, up to 1 in. long, slightly

dilated at the throat; limb spreading, lobes 5 rounded. *Anther*-cells .05 in. long; filaments villous; staminodes subulate, villous, .15 to .2 in. long. *Fruit* oblong, ovoid or somewhat pyriform, tipped with the long remains of the style; pyrenes plano-convex, very hard, .2 to .25 in. long. *Seed* oblong, .15 in. long; testa membranous; cotyledons obovate, .1 in. long, fleshy. Schauer in DC. Prodr. XI. 565; Bot. Mag. t. 976; Cooke Bomb. Fl. II. 422; Baker in Dyer Fl. Trop. Afr. V. 284. *Verbena mutabilis*, Jacq. Coll. 2, 334; Icon. Rar. 2, 207; Andr. Bot. Rep. t. 435.

PENANG: *Curtis* 867; *Birch*; *Ridley* 7044. SINGAPORE: in waste places, *Deschamps*.—DISTRIB. A native of Tropical America, widely spread in the Old World, *e.g.*, Southern India, Java, Central Africa

Tribe II. VITICEÆ.

4. GEUNZIA, Blume.

Trees or large shrubs, stellately tomentose. *Leaves* opposite or occasionally alternate by the separation of the leaves of a pair, petiolate, entire. *Flowers* small, in many-flowered pedunculate cymes in the upper axils of the branchlets; bracts linear, small. *Calyx* campanulate, shortly 5- to 6-toothed. *Corolla* campanulate; tube exsert, funnel-shaped; lobes 5, spreading. *Stamens* 5 to 6; anthers oblong, exserted, glandular, dorsifixed; cells parallel, dehiscing longitudinally but more widely at tip; filaments slender. *Ovary* imperfectly 5-, rarely 4- to 3-celled; the cells 2-ovulate; the ovules fixed laterally above the middle of the cell; style exsert, stout; stigma 5- or less lobed, dilated. *Drupe* small, globose, depressed, on the persistent not enlarged calyx; exocarp thin; mesocarp granular; endocarp hard; pyrenes 5 to 10, equal in number to the ovules, 1-seeded. *Seeds* small, oblong-ovoid; testa thin; albumen none; cotyledons fleshy; radicle inferior.—DISTRIB. 3 to 4 species, of the Malay Peninsula and Archipelago.

GEUNZIA FARINOSA, Blume Bijdr. 819 (1826). A large tree, reaching 60 to 70 ft. in height and a considerable diameter; the upper branches, inflorescence, and under surface (also upper surface when young) of leaves covered more or less densely with stellate furfuraceous pale brown tomentum, and also often with minute rounded glands. *Leaves* coriaceous, ovate or elliptic-oblong, long cuspidate-acuminate at apex, rounded or subacute at base; upper surface when young farinose, later glabrous; lower surface rugose; margin entire or minutely denticulate, 5 to 9 in. long, 2 to 4 in. broad; midrib prominent; main nerves 10 to

12 pairs obliquely curved upwards and joined by many more or less parallel transverse nerves; reticulations close; petiole stout, 1 in. long, channelled above, the opposite ones joined by a raised line. *Cymes* rounded, dichotomously branched, 1.5 to 2 in. broad; peduncles 1 to 1.5 in. long; bracts subulate, .15 to .2 in. long; pedicels very short; flowers reddish-purple. *Calyx* .06 in. deep, glabrous within. *Corolla*-tube .1 to .2 in. long, glandular; lobes recurved, .05 in. long, rounded. *Stamens* exserted; filaments a little longer than the corolla-tube; anthers .1 in. long, very glandular on the back. *Drupe* reddish-black when ripe, .15 in. broad, .1 in. in diam., top depressed. Clarke in Hook. f. Fl. Br. Ind. IV. 566; Boequeron Revis. Verben. 89, t. 8; Koord. & Valetton Bijdr. VII. 173. *G. Cumingiana*, Rolfe in Journ. Linn. Soc. XXI. 315. *Callicarpa pentandra*, Roxb. Fl. Ind. I. 395; Wall. Cat. 1836; Schauer in DC. Prodr. XI. 646; Miq. Fl. Ind. Bat. II. 885. *C. acuminatissima*, Teyssm. & Binn. in Batav. Nat. Tijdschr. XXV. 409. *C. Cumingiana*, Schauer, l. c. 644.

KEDAH: on Langkawi Island, *Curtis* 2552. PERAK: *King's Collector* 859, 972 (part), 5731, 8547. SELANGOR: at Batu Tiga, *Curtis* 3767; at Ginting Bidai, *Ridley* 7599; at Rawang, *Ridley* 10494. SINGAPORE: *Wallich* 1836.—DISTRIB. Java (*Forbes* 315, 375, 539, 602; *Kollman*; *Koorders* 15204B), Borneo (*Beccari* 786; *Haviland* 554, 1343, 3553; *Motley* 385), Amboina, Philippine Islands, &c.

The following Bornean species seems to be undescribed:—

GEUNSA HAVILANDII, King & Gamble in Kew Bull. 105 (1908). A tree (?); branches, inflorescence, and under surface of leaves densely tawny-stellate-pubescent and strigosely hairy. Leaves opposite, ovate or ovate-oblong, shortly acuminate and mucronate at apex, acute or cuneate at base; upper surface strigosely scabrous-hispid on the upper surface, especially on the midrib; lower surface rugose, stellate-pubescent and studded with peltate glands; margins rather distinctly denticulate; 2.5 to 6 in. long, 1.5 to 2.5 in. broad; midrib stout, prominent; main nerves 9 to 11 pairs, prominent beneath, gently curving upwards to anastomose near the margin, joined by conspicuous transverse nervelets; reticulations netted; petiole stout, tawny-hispid, .5 to .75 in. long. *Cymes* axillary, few-flowered, subsessile, scarcely longer than the petiole; bracts very small, subulate; pedicels slender, short. *Calyx* campanulate, glabrous within, without very strigosely hispid; teeth 5, minute in bud, afterwards elongating to .05 in. long. *Corolla* campanulate, nearly glabrous except for peltate shining glands; tube .1 in. long; lobes 5, ovate, rounded, about .075 in. long, recurved in flower. *Stamens* exserted; filaments slender, glabrous; anthers .1 in. long, oblong, prominently yellow-glandular on the back. *Ovary* thickly glandular, depressed; style slender, .2 in. long; stigma shortly 5-lobed. *Drupe* reddish-black when dry, .15 in. in diam., top depressed, dividing into 5 pyrenes; fruiting calyx flattened.

BORNEO: at Sarawak, *Beccari* 3240; *Haviland* 3549 K and L; near Kuching, *Haviland* 889.

We are a little in doubt whether this is the *G. Beccariana*, Briquet in Engl. & Prantl Nat. Pflanzenfam. IV. 3 and 165, of which we can find no description. We think, however, that Briquet's *G. Beccariana* is Beccari 2759, a beautiful species from Sarawak with long tawny hair.

5. *CALLICARPA*, Linn.

Trees or shrubs, more or less clothed with stellate or farinose tomentum, with or without glandular scales, rarely quite glabrous. *Leaves* opposite, rarely ternately whorled; crenulate serrulate or rarely entire, in one species lobed. *Flowers* small, white red or purple, in axillary sessile or pedunculate, usually many-flowered, cymes; bracts linear, inconspicuous. *Calyx* very small, shortly campanulate, truncate or minutely 4-lobed, unaltered in fruit. *Corolla* small, campanulate or tubular; tube twice as long as the calyx or less; lobes 4, oblong, erect or spreading. *Stamens* 4 equal, inserted at about the middle of the tube or lower, sometimes at the base; filaments slender, exsert; anthers ovate or oblong, dorsifixed; the cells parallel, both sides usually prominently glandular. *Ovary* imperfectly 2-celled; cells 2-ovuled; style elongate; stigma dilated, shortly and obscurely bifid; ovules attached at the middle of the cell or higher. *Fruit* a small globose drupe, supported by the persistent calyx; exocarp thin; mesocarp fleshy; endocarp bony, of 4 or fewer pyrenes, convex on the back, flattened on the sides. *Seeds* small, oblong; testa membranous; albumen none or evanescent; cotyledons fleshy; radicle inferior.—**DISTRIB.** About 30 species, of Tropical and Subtropical Asia, to Japan, Australia and Polynesia; also in Central America and the West Indies.

Lower surface of leaves covered with dense stellate tomentum, without or with very few glandular dots; margins of leaves entire or nearly so:—

Leaves broad, more or less elliptic; cymes long, many-flowered:—

Leaves long-acuminate, tomentum thick; cymes dense;

corolla-tube only about .075 in. long, merely puberulous

Leaves obtuse or very shortly acuminate, tomentum thin;

cymes spreading; corolla-tube .1 in. long, stellate-pubescent

Leaves narrow, lanceolate; cymes short, few-flowered; corolla-

tube .15 in. long, stellate-pubescent

Lower surface of leaves densely grey stellate-flocculose, with many glandular dots on both surfaces; margins of leaves serrate:—

Cymes spreading, reaching 3 to 4 in. in diam.; upper surface of

leaves glabrate, lower densely grey-flocculose

Cymes dense, rounded, rarely 1 to 2 in. in diam.:—

Upper surface of leaves glabrate, lower whitish-grey,

stellately tomentose

1. *C. arborea*.

2. *C. Maingayi*.

3. *C. angustifolia*.

4. *C. Reeresii*.

5. *C. cana*.

Upper surface of leaves hispid-puberulous, lower thinly grey-stellate-tomentose	6. <i>C. pedunculata</i> .
Lower surface of leaves sparsely stellate hairy, with many glandular dots; margins of leaves serrulate; cymes rounded, up to 2 in. broad	7. <i>C. longifolia</i> .

1. *CALLICARPA ARBOREA*, Roxb. Hort. Beng. 10 (1814), and Fl. Ind. I. 390 (1832). A tree reaching 40 ft. in height, with thick trunk and round head; branches stout; branchlets thick, obtusely quadrangular, covered with dense grey-tawny, forked, stellate or mealy tomentum, as are the young leaves and inflorescence. *Leaves* coriaceous; ovate or elliptic-ovate, acuminate at apex, long acute or cuneate at base; upper surface when young with mealy soft stellate-tomentum, afterwards glabrous, lower closely tawny-stellate tomentose; margins entire or sometimes distantly denticulate; 6 to 12 in. long, 2 to 5 in. broad; midrib very stout, much raised beneath; main nerves stout, 8 to 14 pairs, raised beneath and joined by fairly regular transverse raised nervules, the main nerves starting at an angle of about 55° with the midrib and curving gently to the margin, where they anastomose; petiole stout, 1 to 2·5 in. long, channelled above. *Cymes* very many-flowered, widely dichotomously branched many times, reaching 6 in. in length and about 5 in. in breadth; peduncles 1 to 3 in. long; bracts linear-subulate, ·25 in. long or less; pedicels very short; flowers red or purple. *Calyx* ·05 in. long, truncate and minutely 4-toothed at mouth, glabrous within. *Corolla*-tube ·075 in. long, puberulous without; lobes 4, reflexed, subquadrate, as long as tube, villous without. *Stamens* long, exsert; anthers glandular-punctate on the back. *Ovary* villous; style much exsert, bent outwards, enlarged upwards; stigma peltate at first, then broadly funnel-shaped. *Drupe* ·15 to ·2 in. in diam., succulent, purple, ultimately black; pyrenes 4 or less. Wall. Cat. 1826 chiefly. Schauer in DC. Prodr. XI. 641; Brandis For. Fl. 368; Kurz For. Fl. II. 274; Clarke in Hook. f. Fl. Br. Ind. IV. 567; Prain Beng. Plants 827. *C. tectonæfolia*, Wall. Cat. 1827.

KEDAH: at Campong Yan, *Ridley* 5607. PENANG: Tanjong Bunga, *Curtis* 699; Batu Gaja jungles, *Deschamps*. PERAK: *Wray* 1824, 3957; at Bruas Dindings, *Ridley* 7179; *Scortechini*; *King's Collector* 972 (part).—DISTRIB. India (Kumaon to Assam, Sonthal Parganas. Chota Nagpore, Eastern Bengal), Burma, Sumatra (*Teysmann* 4388; *Forbes* 1530, 2601).

VAR. *villosa*, Roxb. Hort. Beng. 10 (species). *Leaves* 6 to 8 in. long, 3·5 to 4·5 in. broad, ovate, caudate-acuminate at apex, rounded and then slightly decurrent at base. Tomentum of branchlets, young leaves, and inflorescence very thick and pale, chiefly consisting of

branched hairs. This var. resembles *C. lanata*, Linn., of Southern India and Ceylon in its leaves, but the flowers are those of *C. arborea*.

PERAK: *Scortechini*.

2. *CALLICARPA MAINGAYI*, King & Gamble in Kew Bull. 106 (1908). A tree; young branches, inflorescence, and leaves beneath covered with minute golden-brown stellate tomentum; branchlets stout, obtusely quadrangular. *Leaves* coriaceous, elliptic or elliptic-obovate, rounded and very shortly acute or acuminate at apex, rounded and then somewhat cuneate at base, the two sides often unequal; upper surface glabrous except the midrib and main nerves of young leaves; lower surface rugose and very minutely appressed stellate-pubescent; margins entire or undulate with minute denticulations at the ends of the nerves; 6 to 12 in. long, 3 to 6 in. broad; nerves all impressed on the upper surface, sharply and strongly raised on the lower; the midrib stout; main nerves 10 to 12 pairs, starting at about 75° with the midrib and curving upwards to anastomose near the margin, the pairs joined by fairly regular transverse nervules, and these again by the netted reticulations; petiole 1.5 to 2 in. long, stout, channelled above. *Cymes* many-flowered, rounded, reaching 3.5 in. long and 6 in. broad, widely dichotomous; peduncle stout, flattened, 1 to 1.5 in. long, further branch-peduncles also flattened when dry; bracts linear-subulate, very small; pedicels .05 to .1 in. long, slender. *Calyx* hemispherical, .05 in. long, tawny stellate-pubescent without, glabrous within, with 4 minute teeth. *Corolla*-tube nearly cylindric, .1 in. long, densely and closely grey-stellate-tomentose without, nearly glabrous within; lobes short, rounded, erect or slightly recurved, .04 in. long, villous within. *Stamens* inserted at .04 in. from base of tube; filaments .175 in. long; anthers oblong, .075 in. long, glandular-punctate on the back. *Ovary* villous; style slender, bent; stigma broad, peltate. *Drupe* small, black, .06 in. in diam. (immature).

SELANGOR: *Ridley* 2787. MALACCA: *Maingay* (K.D.) 1192; at Hulu Chembong, *Derry* 1005, Vern. "*Tampang Besi*."

In Kew Herbarium, Maingay's specimen has been placed under *C. arborea*, but the species differs in many respects. The venation of the leaves is very different, as is the tomentum of much smaller stellate hairs; the leaves are nearly blunt; the tube of the corolla much longer, and its lobes much shorter; and we have no hesitation in describing it as a new species.

3. *CALLICARPA ANGUSTIFOLIA*, King & Gamble in Kew Bull. 106 (1908). A shrub, reaching 8 to 9 ft. in height; branchlets, inflorescence, and leaves beneath (also young ones above) clothed with appressed grey or ferruginous stellate tomentum; branchlets obscurely quadrangular.

gular. *Leaves* subcoriaceous; lanceolate, attenuately acute at apex, long attenuate at base and decurrent; upper surface dark, glabrous except when young; lower densely tomentose, grey-tawny or silvery; margins entire or rarely obscurely denticulate, slightly recurved; 4 to 7 in. long, .75 to 1.5 in. broad; midrib stout, impressed above, prominent beneath; main nerves 9 to 15 pairs, rather irregular, starting at from 60° to 70° with the midrib and at once curving upwards to and along the margin, joined by subparallel transverse nervules; petiole .5 to .75 in. long, the bases of the opposite leaves joined by a well-marked ridge. *Cymes* few-flowered, .5 to .75 in. long and about .75 in. broad, widely dichotomous; peduncles .25 to .35 in. long; bracts linear-subulate; pedicels very short, jointed; flowers bluish-pink. *Calyx* campanulate, .075 in. long, densely stellate-tomentose without, glabrous within; teeth mucronulate. *Corolla* about twice as long as calyx, densely stellate-tomentose without, glabrous within; lobes rounded, erect. *Stamens* inserted at or very near the base of the corolla-tube; filaments slender, .15 in. long, scarcely or not exsert; anthers .06 in. long, oblong, much glandular-dotted on both sides. *Ovary* villous; style slender, exsert; stigma capitate. *Drupe* glabrous, globose, .1 in. in diam., dark blue when ripe; pyrenes 4.

KEDAH: on Langkawi Island, *Ridley* 8330. PERAK: at Ipoh, *Curtis* 3197; at Batu Kuran, *Scortechini* 1596; on the top of limestone hills 600 to 1000 ft., *King's Collector* 7036, 8236.

The Kedah specimens have narrower leaves than the rest, with more slender branchlets. The species comes near to *C. angusta*, Schauer, from the Philippines, but differs in the almost quite entire leaves and larger flowers and fruit.

4. *CALLICARPA REEVESII*, Wall. Cat. 1830 (1828). A shrub; the branches, petioles, under surface of leaves, and inflorescence covered with a soft, whitish-grey or pale tawny, mealy tomentum of branched or stellate hairs. *Leaves* coriaceous; lanceolate or elliptic-lanceolate, long acute at apex, attenuate at base and often slightly unequal, not decurrent; upper surface dark when dry, glabrous except the nerves, lower tomentose; margins entire for the lower third, above that shortly dentate-serrate; 5 to 8 in. long, 2 to 3 in. broad; midrib stout; main nerves 13 to 15 pairs, nearly regular, starting at an angle of 45° to 60° with the midrib and curving gently to the margin, each pair joined by rather obscure transverse nervelets, all slightly impressed above; petiole .75 in. long. *Cymes* axillary, rounded, many-flowered, widely dichotomous, reaching 4 in. long and about 3 in. broad; peduncles 1.5 to 2 in. long; bracts linear subulate, .1 in. long; pedicels short, slender, nearly glabrous, .05 to .1 in. long; flowers purple? *Calyx* very

short, nearly glabrous but with a few stellate hairs and minutely glandular-punctate, very shortly 4-toothed. *Corolla* twice as long as calyx, .1 in. ; lobes rounded, sparsely stellate-pubescent and glandular-punctate. *Stamens* long exsert; filaments slender; anthers small; the connective glandular-punctate. *Ovary* rounded, very glandular; style very long, twisted; stigma peltate, large. *Drupe* purple, small, .075 to .1 in. in diam., nearly globose; pyrenes 4. Schauer in DC. Prodr. XI. 641; Benth. Fl. Hongk. 270; Clarke in Hook. f. Fl. Br. Ind. IV. 568. *C. nudiflora*, Hook. and Arn. Bot. Beech. Voy. 206, t. 46.

SINGAPORE: near the Botanic Gardens, Murton 87; Ridley 6884 cult.!—DISTRIB. Tenasserim (?) (Falconer); Southern China.

5. *CALLICARPA CANA*, Linn. Mant. 198 (1771). A shrub; branchlets, leaves beneath, and inflorescence covered with a down of whitish or grey or cinnamonaceous stellate hairs; branchlets obtusely quadrangular. *Leaves* membranous; ovate, ovate-elliptic or ovate-lanceolate, shortly acuminate at apex, cuneately attenuate at base; upper surface stellate-tomentose when young, afterwards glabrous, shining and dark-coloured, glandular-punctate; lower more or less whitish-grey stellate-tomentose, sometimes glabrescent, sometimes rugose, but more usually softly and conspicuously hairy, glandular-punctate beneath the tomentum; margins glandular-serrate, except at the cuneate base; 4 to 7 in. long, 2 to 3 in. broad; midrib rather slender, pubescent above; main nerves 10 to 12 pairs, impressed above, slightly raised beneath, starting at an angle of 40° to 45° with the midrib and curving upwards to the margin, joined by regular transverse nearly parallel nervules; reticulations netted, impressed above; petiole .25 to .75 in. long, upper part bordered by the decurrent margins of the blade. *Cymes* many-flowered, rounded, scarcely longer than the petioles, dichotomous; peduncles about .25 in. long; bracts linear-subulate, very small; pedicels very short; flowers pale-red. *Calyx* densely white-stellate-tomentose without, glabrous within, .05 in. long; teeth very minute. *Corolla* campanulate; tube glabrous, .075 in. long; lobes rounded, .025 in. long, slightly white-villous without. *Stamens* inserted close to the base of the tube; filaments much exsert, twisted, .15 in. long; anthers .02 in. long; the connective glandular-punctate. *Ovary* somewhat depressed; style decurved, often twisted, as long as filaments; stigma funnel-shaped. *Drupe* globose, under .1 in. long in diam., purple; pyrenes 4. Vahl Symb. III. 12; Roxb. Fl. Ind. I. 392; Wall. Cat. 1834; Blume Bijdr. 817; Dene in Nouv. Ann. Mus. III. 401; Schauer in DC. Prodr. XI. 643; Miq. Fl. Ind. Bat. II. 885; Benth. Fl. Austral. V. 56; Clarke in Hook. f. Fl. Br. Ind. IV. 568. *C. tomentosa*, Lamk. Dict. I. 562. *C. americana*, Lour. Fl. Cochinch. 70, not of Linn. *C. adenanthera*, Br. Prodr. 513.

C. Heynei, Roth Nov. Sp. 82; Blume Bijdr. 819. *C. bicolor*, Juss. in Ann. Mus. VII. 77; Schauer in DC. l. c. 642. *C. sumatrana*, Miq. l. c. 886. *C. dentata*, Herb. Roxb.; Wall. Cat. 1834, not of Roth.

PENANG: *Wallich* 1834; *Porter*; *Phillips*. NEGRI SEMBILAN: Port Dickson, Sungai Ujong, *Ridley* 9574. MALACCA: *Maingay* (K.D.) 1190; *Griffith*; *Ridley* 1589. SINGAPORE: *Kurz* 2908.—DISTRIB. Malay Archipelago, Philippine Islands, Australia.

Clarke in Fl. Br. Ind. does not quote Bot. Mag. 2107, which Bentham had said probably represented a much more woolly plant, though it might be a var. of *cana*. With this we agree.

6. *CALLICARPA PEDUNCULATA*, Br. Prodr. Fl. Nov.-Holl. 513 (1810). A shrub with rather loose tomentum; branchlets stellate-pubescent. *Leaves* membranous; ovate, cuspidate-acuminate at apex, rounded at base; upper surface hispid-puberulous above, especially on the nerves, lower surface thinly whitish-grey stellate-tomentose; margins serrulate on the upper two-thirds; 3 to 6 in. long, 1.5 to 3 in. broad; midrib slender, main nerves about 10 pairs, curving gently upwards to the margin; transverse nervules many and rather prominent; petiole .25 to .5 in. long. *Cymes* rather dense, globose, stellately woolly, on peduncles .25 to .75 in. long; bracts and bracteoles linear subulate; pedicels extremely short. *Calyx* campanulate, about .03 in. long, stellate-pubescent and glandular; teeth short, thick. *Corolla* funnel-shaped, .125 in. long; tube nearly glabrous; teeth rounded puberulous within. *Stamens* inserted at the base of the tube; filaments long exsert, slender; anthers elliptic-reniform, the connective prominently gland-dotted. *Ovary* rounded, glabrous, glandular; style very long; stigma thick, capitate. *Drupe* dark purple, globose, .1 in. in diam.; exocarp smooth. Benth. Fl. Austral. V. 57; Clarke in Hook. f. Fl. Br. Ind. IV. 569. *C. cuspidata*, Roxb. Fl. Ind. I. 394. *C. dentata*, Roth Nov. Sp. 81; Blume Bijdr. 818; Wall. Cat. 6319. *C. cana*, Wall. Cat. 1834, No. 2. *C. lanata*, Schauer in DC. Prodr. XI. 644, not of Linn. or of Vahl. *C. tiliaefolia*, Teysm. & Binn. fide Kurz MS.

PENANG: *Wallich* 1834, 2, 6319.—DISTRIB. Malay Archipelago, Tropical Australia.

7. *CALLICARPA LONGIFOLIA*, Lamk. Dict. I. 563 (1785), and Ill. t. 69 (1791). A shrub, reaching 5 to 6 ft. in height; branchlets, inflorescence, and leaves beneath rather sparsely covered with a short grey or tawny tomentum of stellate hairs; branchlets obtusely quadrangular, slender. *Leaves* membranous; lanceolate, ovate-lanceolate or occasionally oblong-lanceolate, long acuminate at apex, acuminate narrowed at base or rarely almost rounded; upper surface nearly glabrous, lower also some-

times glabrescent, more usually sparsely stellate-hairy; both surfaces gland-dotted; margins serrulate except near the base; 3 to 7 in. long, 1.5 to 3 in. broad; midrib slender but prominent beneath; main nerves 10 to 12 pairs, starting at an angle of 50° to 60° with the midrib and curving upwards to and along the margin, joined by regular parallel transverse nervelets, all nerves and midrib more or less pubescent; petiole .5 to 1 in. long, slender. *Cymes* dichotomously divaricate-branched, rounded, 1 to 1.5 in. long, and up to 2 in. broad; peduncles .35 to .5 in. long; bracts linear-subulate; pedicels slender, short, glabrescent in fruit; flowers pale blue, purplish, pink or white (Benth. in Fl. Austral.). *Calyx* campanulate, .05 in. long, glandular-dotted and sparsely stellate-hairy; teeth 4, mucronulate. *Corolla* nearly twice as long as calyx, pubescent without, glabrous within; lobes rounded, erect or incurved, about .025 in. long. *Stamens* inserted at the very base of the tube; filaments long exsert, slender, twisted; anthers ovate-orbicular; the connective prominently gland-dotted. *Ovary* villous; style long, curved, often deflexed; stigma funnel-shaped. *Drupe* white, depressed, glandular, .05 to .07 in. in diam.; pyrenes 4. Bot. Reg. t. 864; Roxb. Fl. Ind. I. 394; Brandis For. Fl. 369; Kurz For. Fl. II. 275; Schauer in DC. Prodr. XI. 645, Var. *β floccosa*; Benth. Fl. Austral. V. 57; Miq. Fl. Ind. Bat. II. 887; Koord. & Val. Bijdr. I. 176; Clarke in Fl. Br. Ind. IV. 570. *C. Roxburghiana*, Roem & Sch. Syst. III. Mant. 54. *C. attenuata*, Wall. Cat. 1835. *C. cana*, Wall. Cat. 1834 (*partly*). *C. dentata*, Wall. Cat. 6319 (*partly*).

KEDAH: on Langkawi Island, *Curtis* 2134. PENANG (or SINGAPORE): *Wallich* 1835. PENANG: at waterfall and half-way up hill, *G. King*; *Stoliczka*. PERAK: *Scortechini* 1214; *King's Collector (Kunstler)* 80, 239. MALACCA: *Griffith* (K.D.) 6039; *Maingay* (K.D.) 1191. SELANGOR: *Curtis*. JOHORE: at Jaffaria, *G. King*. SINGAPORE: *Lobb*; *Hullett*; *Cantley* 120; *Schomburgk* 54; *G. Thomson* 44; *Walker* 207; *Deschamps* (cult.).—DISTRIB. Java, Sumatra, Borneo, to North Australia.

6. TECTONA, Linn. f.

Trees, stellately tomentose. *Leaves* opposite or whorled, large, entire, petioled. *Flowers* in dichotomous many-flowered cymes, in large terminal panicles; bracts small, narrow. *Calyx* campanulate, shortly 5- to 6-lobed, enlarged and becoming bladder-like in fruit and then ovoid or urceolate. *Corolla* small, white or bluish; tube short; limb with 5 to 6 short subequal spreading imbricate lobes. *Stamens* 5 to 6, attached near the base of the corolla-tube, equal, exserted;

anthers ovate or oblong with distinct parallel cells. *Ovary* fleshy, 4-celled; each cell 1-ovuled, ovules attached near their bases to the axis; style linear; stigma shortly bifid. *Fruit* a drupe enclosed in the accrescent calyx; exocarp spongy-suberose or almost none; endocarp bony, thick, 4-celled. *Seeds* erect, oblong; testa membranous; albumen 0; cotyledons fleshy and oily; radicle short, inferior.—**DISTRIB.** Species 3, one in India and Malaya, one in Burma, the third in the Philippine Islands.

TECTONA GRANDIS, Linn. f. Suppl. 151 (1781). A large deciduous tree; branchlets quadrangular, channelled, stellately tomentose, as are the young leaves, leaves beneath and inflorescence. *Leaves* coriaceous-chartaceous; ovate elliptic or obovate, acute or shortly acuminate at apex, rounded acute or cuneate often decurrent at base; upper surface stellate-tomentose when young, afterwards glabrescent, scabrous and punctate with round whitish glands, lower with grey or tawny stellate tomentum; margins entire; 1 to 2 ft. long, 6 in. to 1 ft. broad (leaves of seedlings and coppice shoots often much larger); midrib very stout, much raised beneath; main nerves 8 to 12 pairs, branched and curving upwards, joined by numerous prominent parallel transverse nervules; petiole .5 to 1.5 in. long, very stout, rounded below, the bases of opposite petioles joined by a prominent ridge. *Panicles* 1 to 3 ft. in length and breadth, much spreading, 2- to 3-chotomous; ultimate branches with a sessile fertile flower in the angle; peduncles quadrangular, 0 to 3 in. long; bracts lanceolate or spatulate, lower ones leafy, in pairs at the forks; pedicels very short; flowers white. *Calyx* in flower globose-campanulate, .125 in. long; lobes 5 or 6, .05 in. long, acute; calyx in fruit ovoid, ventricose, reticulate, often 1 to 1.5 in. in diam., with small teeth nearly closing the orifice. *Corolla* white, glabrous, 5 to 6-lobed; tube about .1 in. long; limb spreading; lobes subequal. *Ovary* densely hairy. *Drupe* subglobose, .5 to .75 in. in diam., indistinctly 4-lobed; pericarp soft, with dense felted stellate or branched hairs; endocarp thick, bony. *Seeds* obovoid; testa thin; cotyledons conform with the seed, fleshy; radicle very small. Gaertn. Fruct. I. 275, t. 57; Roxb. Cor. Pl. I. 10, t. 6, and Fl. Ind. I. 600; Wall. Cat. 772; Schauer in DC. Prodr. XI. 622; Dalz. & Gibs. Bomb. Fl. 199; Bocq. Rev. Verb. 99, t. 10; Bedd. Fl. Sylv. Madr. t. 250; Brandis For. Fl. 354, t. 44; Kurz, For. Fl. II. 259; Bl. Bijdr. 820; Miq. Fl. Ind. Bat. II. 901; Clarke in Hook. f. Fl. Br. Ind. IV. 570; Cooke, Fl. Bomb. II. 424; Prain Beng. Plants, 828; Koord. & Val. Bijdr. VII. 165; Briquet in Engl. & Prantl Nat. Pflanzenfam. IV. 3A, 167, t. 63. "*Theka*," Rheede Hort. Mal. IV. 57, t. 27; Rumph. Herb. Amb. III. t. 18.

MALAY PENINSULA: Burma to Malacca, *vide* Fl. Br. Ind. &c.—
DISTRIB. India, Burma, Siam, Sumatra, Java. The teak-tree, often
cultivated (MALACCA: *Maingay*, (K.D.) 1193).

We include here the teak-tree, on the authority of the Fl. Br. Ind., but there are
no specimens from the Malay Peninsula, from wild trees, in either of the herbaria of
Kew or Calcutta. Mr. Ridley informs us that, so far as he is aware, the teak-tree is
nowhere indigenous in the Malay Peninsula.

7. PREMNA, Linn.

Trees or shrubs, sometimes climbing. *Leaves* opposite or some-
times in whorls of 4, entire or toothed. *Flowers* in corymbose or
paniced or sometimes thyrsoid, pubescent, terminal cymes; bracts
small, narrow; bracteoles 0. *Calyx* small, campanulate, truncate,
2-lipped or shortly 2- to 5-toothed. *Corolla* small; tube short, often
villous within; limb 2-lipped, 5-lobed or subequally 4-lobed. *Stamens*
4 didynamous, inserted below the throat of the corolla-tube, rarely
exserted; anthers ovate or rounded, the cells parallel or divergent.
Ovary 2- or 4-celled, 4-ovuled; style linear; stigma shortly bifid.
Fruit a small drupe, surrounded below by the calyx, globose or
obovoid; mesocarp thin, fleshy; endocarp of 1 pyrene, hard, undivided,
4-celled or by abortion 1- to 3-celled, with a central cavity. *Seeds*
oblong; testa thin; albumen 0; cotyledons flat; radicle inferior.—
DISTRIB. Species 40 or more, in the warmer regions of the Old
World.

Calyx clearly 2-lipped:—

Upper lip of calyx 3-lobed; lower 2-lobed:—

Leaves prominently crenate-dentate, ovate or ovate-deltoid,
cordate 1. *P. littoralis*.

Leaves entire or very obscurely and distantly toothed, ovate 2. *P. flavescens*
var. *rubens*.

Upper lip of calyx 2-lobed:—

Lower lip of calyx entire or obscurely lobed; corolla-tube
funnel-shaped:—

Cymes in panicles of interrupted spikes; leaves subsessile 3. *P. Derryana*.

Cymes in corymbose panicles: leaves petioled:—

Corymbs small, under 2 in. in diam.; leaves under 3·5 in.
long 4. *P. integrifolia*
var. *angustior*.

Corymbs rather large, reaching 5 in. in diam.; leaves
over 3 in. long.

Corymbs lax:—

Main nerves of leaves 6 to 8 pairs; leaves acuminate
at apex, truncate or cordate at base; calyx-tube
puberulous 5. *P. foetida*.

Main nerves of leaves 5 to 6 pairs; leaves obtuse or very shortly acute or acuminate at apex:—

- | | |
|--|----------------------------|
| Leaves ovate or elliptic, membrano-chartaceous .. | 6. <i>P. divaricata</i> . |
| Leaves obovate or orbicular, chartaceous .. | 7. <i>P. trichostoma</i> . |
| Leaves elliptic or elliptic lanceolate, coriaceous-chartaceous | 8. <i>P. perakensis</i> . |

Main nerves of leaves 4 to 5 pairs, leaves broadly elliptic

9. *P. punctulata*.

Corymbs compact:—

Corymbs 3 in. in diam.; leaves membranous, ovate-acuminate, cordate or truncate at base, yellowish-brown when dry

10. *P. cordifolia*.

Corymbs 4 to 5 in. in diam.; leaves coriaceous, elliptic or elliptic-lanceolate, shortly acuminate at apex, attenuate at base; reddish-brown when dry

11. *P. Wrayi*.

Corymbs 8 in. in diam.; leaves membranous, broadly ovate, acuminate at apex, truncate or cordate at base; reddish-brown when dry.

12. *P. sterculiifolia*.

Lower lip of calyx 2-lobed, calyx-tube subquadrangular; leaves under 3 in. long; corymbs rather small; corolla-tube slender

13. *P. Ridleyi*.

Calyx not 2-lipped:—

Calyx truncate or very obscurely lobed; leaves coriaceous, elliptic, obtuse at apex, rounded at base

14. *P. Kunstleri*.

Calyx subequally 5-lobed; leaves large, stellate tomentose, as are branchlets and inflorescence

15. *P. pyramidata*.

1. *PREMNA LITTORALIS*, King & Gamble in Kew Bull. 107 (1908). A small tree; branchlets nearly as thick as a goosequill, obscurely angled, tawny-pubescent, with small lenticels; the nodes marked by a ridge connecting the petioles. *Leaves* chartaceo-coriaceous; ovate or ovate-deltoid, acuminate at apex, cordate at base, the sinus .25 to .5 in. deep; both surfaces glabrous except the nerves, which are puberulous; margins acutely crenate-dentate except in the curves of the sinus; 4 to 6 in. long, 2 to 3 in. broad; midrib strong, raised beneath; main nerves 7 to 9 pairs, the lowest 1 to 2 pairs starting from the base and divaricate, the rest starting at an angle of about 50° with the midrib and curving upwards; transverse nervules distant, few, not prominent; petiole 1 to 1.5 in. long, slender, puberulous. *Cymes* in terminal, spreading, 3-chotomous, tawny-pubescent corymbs, reaching 4 in. in length and 6 in. in breadth; peduncles .75 to 1 in. long; primary branches up to 1.5 in. long, rest gradually shorter; bracts linear, persistent, the lowest sometimes leaf-like; pedicels very short, with a pair of minute bracteoles below the calyx; flowers very pale green. *Calyx* .075 to 1 in. long, 2-lipped, upper shortly 3-lobed, lower longer, 2-lobed; lobes rounded; tube pubescent without. *Corolla* 2-lipped, half as long

again as the calyx; upper lip broad, bifid, lower 3-lobed, the midlobe longest; all lobes rounded; tube glabrous without, also within except the belt of thick villous hairs just below the mouth. *Stamens* (in bud) included; filaments short, thick; anthers reniform, very shortly 1- to 2-mucronate. *Ovary* subglobose, depressed, glabrous except for a few glandular scales; style thick; stigma very shortly 2-fid. *Drupe* globose, glabrous, fleshy; endocarp tuberculate; cells 4, one only usually fertile. *Seed* oblong, acute at each end; testa membranous with a corky outer layer; cotyledons shortly oblong, obtuse, cordate, .05 in. long, fleshy.

PERAK: sea-coast at Matang, Wray 2719.

2. *PREMNA FLAVESCENS*, Ham.; Wall. Cat. 2649 (1823); Clarke in Hook. f. Fl. Br. Ind. IV. 578; Prain Beng. Plants, 831.

VAR. rubens, Clarke in Hook. f. Fl. Br. Ind. IV. 578 (1885). A shrub or small tree (a climber—*Koorders* & *Valeton*); branchlets the size of a crow-quill, grey-pubescent, obscurely angled. *Leaves* chartaceous when dry; ovate or ovate-oblong, acuminate at apex, cordate or rounded or somewhat cuneate at base; upper surface shining, sparsely setulose especially on the nerves, lower surface tawny-pubescent; entire or the upper half obscurely and distantly toothed; 4 to 6 in. long, 2 to 2.5 in. broad; midrib rather stout, raised beneath; main nerves 6 to 9 pairs, the lowest 1 or 2 (first very small) pairs from the base, at an angle of about 40° with the midrib, curving upwards to and along the margin, the upper ones joining in an intramarginal looped nerve which ends in the midrib at the acumination; transverse nervules many, conspicuous on the lower surface; petiole 1 to 1.5 in. long, slender, puberulous. *Cymes* in terminal tawny-pubescent corymbs about 4 in. in diam.; branches 3- then 2-chotomous; peduncle 1 to 2 in. long; bracts small, linear; pedicels short, under .05 in. long; flowers greenish. *Calyx* campanulate, .05 to .1 in. long, pubescent without, 2-lipped, upper lip 3-lobed, lower 2-lobed, all lobes obtuse, nearly equal; fruiting calyx saucer-shaped. *Corolla* funnel-shaped, .1 to .15 in. long, 2-lipped, upper lip shortly bilobed, reflexed, lower 3-lobed, the midlobe longest and oblong; tube much villous-hairy within. *Stamens* exsert; filaments flattened; anthers reniform, the cells nearly parallel. *Ovary* glabrous, depressed; style slender, as long as the stamens; stigma 2-lobed, the lobes slender, horizontally spreading. *Drupe* globose, .15 to .2 in. in diam., with numerous shining glands; endocarp tuberculate. *Seed* oblanceolate, about .1 in. long, usually one only in each drupe; cotyledons fleshy, ovate-oblong; radicle thick. *P. lucidula*, Miq. Fl. Ind. Bat. II. 898; Koord. & Val. Bijdr. VII. 188.

MALACCA: Ayer Punnas, Griffith (K.D.) 6020. — *DISTRIB.* Burma, 1022

Java (*Teysmann* No. 10; *Zollinger* 645; *Koorders* 31425 β), Sumatra (*Forbes* 2621—a climbing shrub).

3. *PREMNA DERRYANA*, King & Gamble in *Kew Bull.* 107 (1908). A climbing (?) shrub; branchlets smooth, brown, with large circular or elliptic lenticels. *Leaves* membranous when dry, subsessile; elliptic or obovate, shortly and obtusely acute at apex, attenuate and obscurely auricled at base; both surfaces shining, glabrous; margins entire; 5 to 8 in. long, 3.5 to 4 in. broad; midrib slender, impressed above, raised beneath; main nerves 7 to 8 pairs, often branched, curving upwards to and along the margin where they anastomose; transverse nervules slender, and with the minor reticulations rather prominent. *Cymes* in terminal panicles of three to four spikes, each spike with many interrupted glomerules of sessile flowers, the inflorescence 6 to 8 in. long; main peduncles 2 to 2.5 in. long, secondary peduncles .75 to 1 in. long; bracts lanceolate, at the main divisions, .25 in. long. *Calyx* deeply bilabiate; the upper lip entire at first, afterwards 2-lobed, .125 in. long, the lower one entire, .1 in. long; tube golden-pubescent without. *Corolla*-tube rather longer than the calyx, glabrous except for a few villous white hairs in the throat within; lips 2, posterior lip emarginate, erect, anterior lip 3-lobed, the lobes obtuse, the midlobe the longest. *Stamens* 4 long exsert; filaments puberulous, twisted; anthers reniform; cells opening by oblong pores. *Ovary* glabrous, depressed; cells 4, one only apparently seed-bearing; style slender, as long as the stamens; stigma of 2 slender horizontal lobes. *Drupe* not seen.

PERAK: on Larut Hills, *Derry* (*Curtis* 3701).

4. *PREMNA INTEGRIFOLIA*, Linn. Mant. II. 252 (1771); *Cooke Fl. Bomb.* II. 426; *Prain Beng. Plants*, 830. *P. serratifolia*, Linn. l. c. 253; *Schauer in DC. Prodr.* XI. 632; *Bedd. For. Man. in Flor. Sylv. CLXXII.*; *Trimen Fl. Ceyl.* III. 352. *P. spinosa*, Roxb. *Fl. Ind.* III. 77. *P. sambucina*, Wall. Cat. 1775; *Schauer, l. c.* 631. "*Gumira littorea*," *Rumph. Herb. Amb.* III. 209, t. 134.

VAR. angustior, Clarke in *Hook. f. Fl. Br. Ind.* IV. 574 (1885). A small shrub, 3 to 6 ft. in height; branchlets nearly glabrous, the size of a crow-quill, terete. *Leaves* elliptic or elliptic-ovate, obtusely acute at apex, rounded or narrowed at base; glabrous on both sides except on the midrib and main nerves; margins entire or obscurely crenate-dentate in the upper half; 2 to 3.5 in. long, 1 to 2 in. broad; midrib slender, puberulous above and raised, tawny-villous along the sides and in the axils below; main nerves 4 to 5 pairs, lowest 2 pairs rather close to the base and long, the rest more spreading and curved upwards to join in an obscure intramarginal looped nerve; few transverse nervules and reticulations obscure; petiole slender, puberulous, .25 to .5 in. long.

Corymbs puberulous, terminal or pseudo-axillary in upper axils, up to 2 in. broad; sessile or on peduncles up to 1.5 in. long; branches at first 3- afterwards 2-chotomous; bracts minute, lanceolate; pedicels very short; flowers greyish-white. *Calyx* 2-lipped; upper lip with 2 triangular lobes, lower obtuse, obscurely 2- to 3-dentate; tube rugose and puberulous without, .05 in. long. *Corolla*-tube cylindric, .1 in. long, puberulous; limb 2-lipped; upper lip subequally 3-lobed, the middle lobe slightly the longest and incurved; lower lip rounded obtuse, rather shorter, scarcely .05 in. long; upper half of tube within thickly white-villous. *Stamens* slightly exsert; anther-cells slightly divaricate. *Drupa* obovoid, depressed at top, rugose and obscurely ribbed, .15 in. long; endocarp ribbed, bony, 4-celled. *Seeds* ovoid, acute; testa pale, slightly corky; cotyledons flat, shallowly emarginate at top.

KEDAH: Langkawi Island, *Curtis* 2955. PENANG: *Kunstler* (*King's Collector*) 1670; *J. Scott*. PROVINCE WELLESLEY: at Batu Kawan, *Ridley* 9353. MALACCA: *Griffith* (K.D.) 6030; *Maingay* (K.D.) 1201. SINGAPORE: *Ridley* 8900.—DISTRIB. Amherst in Tenasserim, *Falconer*; tidal forests of Tavoy, *W. A. Hearsey*.

5. *PREMNA FŒTIDA*, Reinw. ex Blume Bijdr. 816 (1825). A large shrub or small tree with spreading branches, reaching 20 to 30 ft. in height; bark white; branchlets subtetragonous to cylindric, tawny-pubescent, as are the young leaves, the nerves of the mature leaves, and the inflorescence; nodes with a prominent villous ridge joining the bases of the petioles. *Leaves* chartaceous; ovate, sometimes ovate-lanceolate, rarely ovate-oblong, shortly acuminate at apex, rounded or truncate or slightly cordate at base; shining on the upper surface and dark when dry; paler, often almost grey on the lower surface; margins entire or slightly repand above; 3 to 6 in. long, 2 to 3.5 in. broad; midrib slender, prominent beneath; main nerves 6 to 8 pairs, the lowest 2 pairs almost from the base, the lowest spreading, the rest at about 45° with the midrib, gently curving to and along the margin; transverse nervules rather distant, irregular; petiole .75 to 2 in. long. *Corymbs* lax, reaching 5 in. long and broad, subsessile or on about 1 in. long peduncles, 3-chotomous below, 2-chotomous above; the branches divaricate; bracts very small, linear; pedicels short, under .05 in. long; flowers white. *Calyx* cup-shaped, .05 to .075 in. long, 2-lipped, upper lip acutely 2-lobed, lower very shortly 3-lobed; tube puberulous without. *Corolla*-tube funnel-shaped, .1 in. long, densely white-villous in the upper half within; obscurely 2-lipped, upper lip short, lower 3-lobed, recurved, the midlobe longest and incurved. *Stamens* attached to the throat of the corolla-tube, shortly exsert; anther-cells elliptic with elliptic pores.

Ovary depressed, glabrous; style short; stigma very shortly bifid. *Drupe* globose, 4-sulcate; epicarp rugose; cells 4, all or fewer with seeds. *Seeds* fusiform, keeled; testa pale. Schauer in DC. Prodr. XI. 630; Miq. Fl. Ind. Bat. II. 891; Koord. & Val. Bijdr. VII. 192. *P. opulifolia*, Miq. l. c. 898. *Gumira fatida*, Hassk. in Florà, 25 beibl. p. 26. "*Gumira domestica*," Rumph. Herb. Amb. III. 208, *fide* Miq. & Schauer.

KEDAH: near sea-level, *Kunstler* (*King's Collector*) 1737. PERAK: on the coast at Matong, *Wray* 2493; near sea-level, *Kunstler* (*King's Collector*) 1016. JOHORE: at Batu Pahat, *Ridley* 11137. SINGAPORE: cult., *Ridley* 6893.—DISTRIB. Java (*Koorders* 20179 β ; *Zollinger* 2740); Borneo (*Haviland & Hose* 3394, &c.).

We follow *Koorders & Valetton* in putting *P. opulifolia*, Miq., under *P. fatida*, Reinw. But our specimens agree better with the description of *P. opulifolia* than with those of *P. fatida*. As pointed out by *Koorders & Valetton*, the description of the calyx given for *P. fatida* as "obsolete sub-4-dentatus, vulgo 3-denticulatus, quarto dente abortivo" is abnormal. That given for *P. opulifolia* is quite correct.

6. *PREMNA DIVARICATA*, Wall. Cat. 1781 (1828). A climbing shrub; branchlets slender, terete, nearly black when dry, with sparse rounded or oblong lenticels. *Leaves* membranous when young, chartaceous when older; ovate or elliptic, briefly acute or bluntly acuminate at apex, rounded or attenuate sometimes subcordate at base; upper surface slightly shining, glabrous except the nerves; lower dull, glabrous except for villous hairs along the midrib and in the axils of the main nerves, obscurely dotted; entire; 3 to 5 in. long, 2 to 3.5 in. broad; midrib slender, slightly impressed above; main nerves 5 to 6 pairs, at an angle of 40° to 60° with the midrib, the lowest 1 to 2 pairs from near the base, curved upwards to join in loops near the margin; transverse nervules few, irregular, inconspicuous, as are the finely netted reticulations; petiole .5 to 1.5 in. long, channelled above. *Corymbs* divaricate, many-flowered, slightly puberulous, terminal, reaching in fruit 5 in. in diam., sessile or on peduncles 1 to 2 in. long, 3-chotomous below, 2-chotomous above; bracts linear-lanceolate, small, the lowest sometimes leafy; pedicels very short; flowers greenish-white. *Calyx* cup-shaped, prominently 2-lipped, the upper lip much longer than the lower, with 2 rounded .03 in. long lobes; the lower entire or shortly 3-toothed; tube rugose without and glandular-dotted. *Corolla*-tube cylindric, .075 in. long, puberulous without, white-villous within on the upper half; limb 2-lipped; upper lip short, retuse, broad; lower lip 3-lobed, the midlobe longest, up to .075 in. *Stamens* inserted near the mouth of the corolla-tube, slightly exsert; anther-cells divaricate.

Ovary rounded; style as long as stamens; stigma very shortly bifid. *Drupe* ovoid, .25 in. long; epicarp smooth; pericarp fleshy; endocarp ribbed; pyrenes 3- to 4-celled. Schauer in DC. Prodr. XI. 681; Clarke in Hook. f. Fl. Br. Ind. IV. 575. *P. lucidula*, Kurz For. Fl. II. 263, not of Miq.

PENANG: beach at Tanjong Bunga, Curtis 215. DINDINGS: Pangkore Island, Ridley 7180. MALACCA: *Maingay* (K.D.) 1198-9; at Sungei Hudang, Goodenough 1350. SINGAPORE: gardens in scrub, Ridley 10841.—DISTRIB. Java.

7. *PREMNA TRICHOSTOMA*, Miq. Fl. Ind. Bat. II. 892 (1856). A large climbing shrub, reaching to a considerable height, the stem reaching 3 to 5 in. in diam.; branchlets thick, shining, glabrous, pale brown. *Leaves* at first chartaceous, afterwards subcoriaceous, very variable; ovate- or obovate-elliptic, sometimes nearly orbicular, shortly acuminate at apex or sometimes attenuately acute, rounded or subcordate or cuneate at base; glabrous on both surfaces except on the nerves; margins entire or sometimes undulate at apex; 4 to 7 in. long, 2 to 5 in. broad; midrib slender, raised beneath; main nerves 5 to 6 pairs, at from 30° to 45° with the midrib, the lowest pair from the base, the next rather close, the rest distant, all straight at first, then branched outwards and curved to join near the margin, raised on both surfaces when old; transverse nervules many; petiole .75 to 1 in. long, puberulous. *Corymbs* terminal, reaching 4 to 5 in. in diam., puberulous, sessile or on 1 in. long peduncles; branches 3- afterwards 2-chotomous, thickening in fruit; bracts lanceolate, short; pedicels none; flowers cream-coloured. *Calyx* cup-shaped, obscurely tetragonous, puberulous without, .05 to .07 in. long, 2-lipped, the upper lip 2-lobed, the lower faintly 2-toothed or entire; all teeth less prominent in fruit. *Corolla* campanulate; tube .1 in. long, densely villous within in the upper half; limb subequally 4-lobed, the lobes rounded, lower one slightly smaller, all recurved. *Stamens* inserted at the mouth of the corolla-tube, long exsert; filaments slightly flattened; anther-cells small, rounded, didymous, opening by elongated pores. *Stigma* 2-fid, the divisions divaricate, rather long. *Drupe* pyriform, 4-celled, one cell only enlarged and seed-bearing. *Seeds* oblong, flattened; testa membranous. Koord. & Val. Bijdr. VII. 184. *P. parasitica*, Clarke in Hook. f. Fl. Br. Ind. IV. 574, not of Blume.

KEDAH: Langkawi Island, Curtis 2796. PERAK: at waterfall, 300 ft., Wray 2403; *King's Collector* 3008, 10310; *Scortechini* 192. MALACCA: *Griffith* 6019. JOHORE: *Ridley* 11136. SINGAPORE: *Ridley* 5026, 6828, 8914.—DISTRIB. Borneo (*Haviland*).

8. *PREMNA PERAKENSIS*, King & Gamble in Kew Bull. 107 (1908).

A shrubby climber; branches brown, sparsely lenticellate, glabrous, smooth. *Leaves* chartaceo-coriaceous; elliptic-oblong or -lanceolate, sometimes -obovate, shortly and bluntly acute at apex, narrowed or cuneate at base; both surfaces glabrous, even the nerves, slightly rugose; margins entire, slightly recurved; 3 to 5 in. long, 1.5 to 2.25 in. broad; midrib stout, impressed above, raised beneath; main nerves 5 to 6 pairs, also impressed above and raised beneath, the lowest pair opposite and from close to the base, starting at from 25° to 40° with the midrib and nearly straight, curving only near the margin where they form a looped intramarginal nerve; transverse nervules many, inconspicuous; petiole .5 to .75 in. long, glabrous, channelled above. *Corymbs* spreading, tawny-puberulous, reaching 6 in. in length and in diam., 3-chotomous, afterwards 2-chotomous, sessile or on stout peduncles 2 to 3 in. long; bracts ovate-lanceolate, those of lower divisions leafy; pedicels 0; flowers pale green with white stamens. *Calyx* obscurely quadrangular, pubescent, nerved, the nerves prominent in fruiting examples, .06 in. long; 2-lipped, the upper lip 2-lobed, the lower, entire or obscurely 2-lobed. *Corolla* funnel-shaped; the tube .125 in. long, densely white-villous in the upper half; limb subequally 4-lobed, the lobes recurved, ciliate. *Stamens* inserted at the mouth of the corolla-tube, long exsert; filaments somewhat flattened; anther-cells nearly globose, didymous, opening by circular pores; connective glandular. *Ovary* glabrous; style long exsert; stigma divaricately 2-fid. *Drupe* smooth, pyriform, one cell only fertile. *Seed* ovate-oblong, flattened; testa membranous.

PERAK: in rocky places in forest, at 800 to 1000 ft., *King's Collector* 7247, 10738; *Scortechini* 516.

This species comes very near to *P. trichostoma*, but has several important points of difference, such as the narrower, thicker leaves with glabrous nerves, the darker branches, the markedly nervose fruiting calyx, the large bracts, and the round openings of the anther-cells, so that we have preferred to describe it as a species instead of as a variety. In the corolla it nearly agrees, as also it does in the absence of pedicels and the one-seeded, pyriform drupe.

9. *PREMNA PUNCTULATA*, Clarke in Hook. f. Fl. Br. Ind. IV. 575 (1885). A shrub or small tree; branchlets dark brown, terete, lenticellate. *Leaves* chartaceous; broadly elliptic, suddenly shortly acuminate at apex, rounded at base; upper surface glabrous, shining, lower surface paler, reddish, puncticulate, pubescent on the nerves; margins entire; 4 to 6 in. long, 2 to 3 in. broad; midrib prominent; main nerves 4 to 5 pairs, the lowest pair very small, close to the base, the next pair a little above, the rest more distant, all curving upwards to

anastomose near the margin; transverse nervules very prominent, as is the netted reticulation; petiole 1 in. long, slender, channelled above. *Corymbs* many-flowered, terminal, paniculate, pubescent, 4 to 5 in. in diam.; lower bracts .5 in. long, linear-oblong; pedicels very short or none. *Calyx* .06 in. long, minutely grey-pubescent and glandular, 2-lipped, upper lip 2-toothed, lower lip also 2-toothed or subentire. *Corolla* tubular, .1 in. long, villous at the throat within, glabrous below; lobes short, rounded. *Stamens* included; filaments inserted in the middle of the tube, short; anthers reniform; cells slightly divergent. *Ovary* glabrous; style rather short; stigmatic lobes slender, recurved. *Drupe* not known.

MALACCA: *Maingay* (K.D.) 1200.

10. *PREMNA CORDIFOLIA*, Roxb. Fl. Ind. III. 78 (1832). A shrub, reaching 8 to 12 ft. in height, with dark brown bark on the old wood; branchlets light brown, darker when dry, the size of a crow-quill, glabrous, terete. *Leaves* membranous; ovate or ovate-cordate, acuminate at apex, rounded or cordate at base; upper surface shining, bullate, drying brown, glabrous except on the midrib and main nerves; lower surface also nearly glabrous, yellowish-brown when dry; margins entire, slightly recurved; 3 to 7 in. long, 2 to 3 in. broad; midrib slender, but strongly raised beneath; main nerves 5 to 6 pairs, at about 50° with the midrib, at first nearly straight and then curving to join in a looped intramarginal nerve, each pair on the same side joined by few (4 to 5) irregular transverse nervules and lesser reticulations; petiole slender, .5 to 1 in. long; upper side tawny-puberulous. *Corymbs* many-flowered, dense, terminal, tawny-puberulous, about 3 in. long, and the same or rather more in diam.; peduncles 1 to 3 in. long, with tawny-puberulous leaf-like bracts; bracts of corymb small, lanceolate, acute; branches at first decussate, then dichotomous; pedicels very short, rather thick; flowers greyish-white. *Calyx* .1 in. long, 2-lipped; upper lip 2-lobed, lower entire; lips short, broad, rounded. *Corolla*-tube .2 in. long, funnel-shaped, densely villous within; limb 2-lipped; anther-cells shortly divergent. *Ovary* glabrous; style as long as corolla-tube. *Drupe* obovoid, slightly depressed at top; exocarp thin, shining, black; mesocarp fleshy; endocarp hard, pitted, 3- to 4-celled, one cell usually only fertile. *Seed* ovoid acute; cotyledons flat, orbicular, .125 in. in diam. Walp. Rep. IV. 94; Schauer in DC. Prodr. XI. 632, partly, not of Wight or Bedd.; Miq. Fl. Ind. Bat. II. 895, in part only; Clarke in Hook. f. Fl. Br. Ind. IV. 572.

PENANG: at Tanjong Bunga, *Curtis* 861; *Kunstler* (King's Collector) 1480. PROVINCE WELLESLEY: at Krian, *Ridley* 9386. SINGAPORE: *Lobb*.

11. *PREMNA WRAYI*, King & Gamble in Kew Bull. 108 (1908). A climbing nearly quite glabrous shrub; branches stout, obscurely quadrangular, dark brown; branchlets similar, darker, smooth. *Leaves* coriaceous; elliptic or elliptic-lanceolate, gradually acuminate at apex, attenuate at base, often unequally; shining and glabrous on both surfaces except for small tufts of hair in the axils of the main nerves beneath, olive-brown when dry; entire; 4 to 8 in. long, 2 to 4 in. broad; midrib stout, impressed above, prominently raised beneath; main nerves 6 to 8 pairs, impressed above, raised beneath, the lowest pair very faint from the base and close to the margin, the next stout and shortly above, the rest distant at about 50° with the midrib, curving upwards to and along the margin, the upper ones joined in a looped intramarginal nerve; transverse nervules straight and fairly regular; reticulations rather prominent on the upper surface when dry; petiole .5 to 2 in. long, channelled above. *Corymbs* dense and compact, about 4 to 5 in. broad at top, glabrate or very minutely puberulous on upper branches and calyx; lower branches 3-chotomous, upper 2-chotomous, much ramified and curving inwards; peduncle about 1 in. long, stout; main branches 1 to 1.5 in. long; bracts very small, linear, the lower ones leafy; pedicels about .05 in. long to the joint below the calyx-tube. *Calyx* deeply 2-lipped; the upper lip sharply 2-lobed, the lower 3-toothed; the lobes spreading in the fruiting stage; tube rugose. *Corolla* not seen. *Drupe* obovoid, .25 in. long and broad; epicarp rugose, glandular-dotted; pyrenes 4. *Seeds* plano-convex, ovate, .175 in. long; testa white-corky; cotyledons oblong, retuse at tip, flat, fleshy, .15 in. long; radicle .025 in.

PERAK: at Tapa, Wray 200.

At first sight this species resembles *P. Kunstleri* in its coriaceous shining leaves and stout branches, but differs in the more compact corymbs and the deeply lobed calyx.

12. *PREMNA STERCULIFOLIA*, King & Gamble in Kew Bull. 108 (1908). A stout, tree-like, climbing shrub; branches reddish-brown, smooth; branchlets terete, purple, sparsely scabridly puberulous. *Leaves* membranous; ovate, acuminate at apex, truncate or somewhat cordate at base; both surfaces reddish-brown when dry; upper sparsely setulose and pubescent on the nerves, lower slightly puberulous, sparsely glandular-dotted; 4 to 9 in. long, 3 to 5 in. broad; midrib prominent, channelled above, raised beneath; main nerves 6 pairs, raised beneath, the 2 lowest pairs from close to the base spreading, the rest at about 40° with the midrib, curved upwards to and along the margin, joined by prominent transverse nervules; petiole 2 to 4 in. long, channelled above. *Cymes* in large spreading, slightly puberulous

many-flowered paniculate corymbs reaching 9 in. long and 8 in. broad; peduncles stout, 3 to 4 in. long; branches 3-chotomous at first, afterwards 2-chotomous; ultimate cymules crowded; bracts linear, very small, caducous; pedicels short, slender; flowers pale green. *Calyx* campanulate, obscurely 2-lipped; the upper lip nearly entire, the lower entire or obscurely toothed; tube .05 in. long, glandular and puberulous, scaly without. *Corolla*-tube funnel-shaped, puberulous, .125 in. long, densely white-villous within except at the base; 2-lipped, upper of 1 short recurved lobe, lower of 3 recurved obtuse lobes, the midlobe the longest, .075 in. long. *Stamens* exsert; the filaments twisted; anthers ellipsoid, divaricate. *Ovary* glabrous, depressed; style slender, nearly .25 in. long; stigma bifid with slender spreading lobes. *Drupe* globose, depressed, much tuberculate and red when dry; pyrene woody, tuberculate, roughly 4-angled. *Seeds* usually 1 only perfect, obovate, .1 in. long; testa membranous; cotyledons conform to the seed, fleshy; radicle pointed.

PERAK: at waterfall, Wray 1828; *Scortechini*; *King's Collector* 3067, 7531, 8373.

VAR. *cordata*, King & Gamble, l.c. *Leaves* more deeply cordate at base; branches of inflorescence more distant than in type; calyx with upper lip 2-lobed, the lower entire or obscurely toothed.

PERAK: *Scortechini* 273.

13. *PREMNA RIDLEYI*, King & Gamble in Kew Bull. 109 (1908). A climbing shrub; branches stout, with grey shining bark; branchlets slender, terete, brown. *Leaves* chartaceous, opposite or sometimes one of each pair rather higher than the other; ovate, ovate-oblong or slightly obovate, rounded or very shortly acute at apex, rounded or attenuate often unequally at base; both surfaces glabrous and dull; margins entire; 1.5 to 3 in. long, .75 to 1.5 in. broad; midrib slender; main nerves 6 to 7 pairs, the lowest 1 or 2 pairs from the base, at an angle of 30° to 40° with the midrib, straight at first, then gently curved to and along the margin; transverse nervules and reticulations faint; petiole slender, .25 to .5 in. long. *Corymbs* terminal, 1.5 to 5 in. long, and 2 to 5 in. broad, many-flowered, tawny-puberulous; peduncles .75 to 2 in. long; branches at first 3- afterwards 2-chotomous; bracts linear-lanceolate, small; pedicels none or minute; flowers greenish-white. *Calyx* campanulate, subquadrangular, 2-lipped, each lip 2-lobed, with minute teeth; tube .05 in. long, puberulous. *Corolla*-tube somewhat tubular, slender, .1 in. long, puberulous in the lower half within, long white-villous in the upper; lobes 4, equal, oblong, rounded at tip, .05 to .075 in. long, incurved at length. *Stamens* inserted, 2 upper at the top of the throat of the corolla-tube, 2 lower lower down; filaments slightly flattened, long exsert; anthers small; cells rounded, slightly

divaricate; connective glandular on the back. *Ovary* rounded, glabrous; style as long as stamens, .2 in.; stigma bifid; the lobes .025 in. long, usually recurved. *Drupe* not seen.

PERAK: *Scortechini* 455. SINGAPORE: garden jungle, *Ridley* 6826.

14. *PREMNA KUNSTLERI*, King & Gamble in Kew Bull. 109 (1908). A large shrub or small tree, nearly quite glabrous, sometimes climbing; branches stout, thick, purplish-brown; branchlets the size of a quill, terete, glabrous, sparsely lenticellate. *Leaves* coriaceous, elliptic, sometimes elliptic-oblong or obovate, obtuse at tip with a short blunt abrupt acumination, rounded or subcordate at base; both surfaces glabrous, more or less shining when dry; margins entire, slightly recurved; 4 to 7 in. long, 2.5 to 4 in. broad; midrib very stout, impressed above, raised prominently beneath; main nerves 5 to 7 pairs at from 50° to 60° with the midrib, the lowest pair small, from the base, the second from close above it, the rest more distant, all curved upwards to join in a looped intramarginal nerve and joined by four irregular transverse veinlets; reticulations minutely netted, forming a prominent network on the upper surface when dry; petiole .75 to 1.25 in. long, smooth but channelled above. *Corymbs* terminal, spreading, long-branched, 3-chotomous below, 2-chotomous above, glabrous except for very minute spare tawny pubescence on the upper branches and calyx-tube, sessile or pedunculate, the peduncle or primary branches 3 to 4 in. long, the whole corymb reaching 7 in. in length and 5 in. in breadth; bracts linear or linear-lanceolate, the lower ones leafy; pedicels very short, less than .05 in. to the joint under the calyx-tube; flowers pale greenish-white. *Calyx* cup-shaped, .075 in. long, truncate or very obscurely 2-lipped, in fruit very shallow and almost quite entire. *Corolla*-tube tubular, .125 in. long, the lower half glabrous and almost hyaline, the upper shortly white-villous; limb 2-lipped, lower lip 3-lobed, the midlobe longest, the two others and the upper lip equal, all erect or incurved. *Stamens* shortly exsert, attached just below the mouth of the corolla-tube; anther-cells rounded, slightly divaricate, pores elliptic. *Ovary* glabrous, depressed, 4-celled; style as long as stamens; stigma very shortly bifid. *Drupe* obovoid, faintly ribbed, .25 in. long; epicarp smooth, waxy-white (*Kunstler*); pyrenes 4-celled, one or more cells fertile. *Seeds* obovate, plano-convex, .15 to .2 in. long; testa white, corky; cotyledons flat, fleshy, .15 in. long, .1 in. broad, retuse at tip; radicle minute.

PERAK: on low ground, under 500 ft. in alt. *King's Collector* 938, 4723, 5949. MALACCA: at Sungli Udang, *Goodenough* 1350.

To this species we also refer *Forbes* No. 1424 from the Lampongs, Sumatra, but the leaves reach over 8 in. in length and 5 in. in breadth with slightly attenuate bases, and the fruiting calyx is rather more 2-lipped.

15. *PREMNA PYRAMIDATA*, Wall. Cat. 1779 (1827). A small or medium-sized tree (a large tree—*Wallich*), reaching 40 to 50 ft. in height, and up to 5 ft. in girth; bark light greyish-brown; branches stout, pale brown; branchlets obscurely quadrangular, stellately tomentose with tawny tomentum. *Leaves* chartaceous; ovate, acuminate at apex, cordate or rounded sometimes attenuate at base; both surfaces brown when dry, the upper dark glabrous except on the nerves, the lower pale glabrescent; margins entire; 6 to 14 in. long, 3 to 8 in. broad; midrib stout, stellate-tomentose on both surfaces; main nerves 7 to 10 pairs, the lowest two pairs from near the base, the rest distant at an angle of about 60° with the midrib, curving gently upwards and joined by many regular transverse nervules very prominent on the under surface; petiole 1 to 4 in. long, channelled above, stellately scurfy-pubescent. *Cymes* in large terminal stellately-pubescent pyramidal panicles or corymbs, reaching 12 in. in length, and 6 to 9 in. in breadth; common peduncle 1 to 3 in. long; branches at first 3- afterwards 2-chotomous, usually ascending; bracts many, linear, reaching .5 in. long; flowers crowded at the ends of the branches on very short pedicels, greenish-white. *Calyx* campanulate, glabrous within, stellately-pubescent without; tube .075 in. long; teeth 5, subequal, about .025 in. long, the posterior three thickened, the two anterior shorter and more slender. *Corolla* bilabiate, .15 to .2 in. long; upper lip broad; lower lip 3-lobed, the midlobe the longest and spreading, the side lobes shorter and more obtuse, usually incurved; tube with a ring of retrorse stiff hairs at the throat, otherwise glabrous. *Stamens* 4, included; anther-cells elliptic, slightly divaricate; filaments stout. *Ovary* glabrous, depressed; style thickened with very shortly bifid stigma. *Drupe* globose or obovoid, glabrous, depressed at top, .2 to .25 in. in diam.; pericarp fleshy; pyrene rugose, very hard, 4-celled. *Seed* usually 1 only, oblong. Schauer in DC. Prodr. XI. 633; Miq. Fl. Ind. Bat. II. 897; Hook. f. Fl. Br. Ind. IV. 576. *P. tomentosa*, Kurz For. Fl. II. 260.

PERAK: *Wray* 3691; *Scortechini*; at Kwala Dipang, *Ridley* 9699; *King's Collector* 923, 2039, 2667, 6851, 10298. SELANGOR: *Ridley* 7596.—DISTRIB. Burma (*Wallich* 1779), Java (*Teysmann* 14), Timor (*Forbes* 3892), &c.

We have identified *Teysmann's* Java specimens as belonging to *P. pyramidata*, but we are not sure if *Koorders & Valetton* (*Bijdr.* VII. 179) considered them to belong to their *P. tomentosa*, which, judging by *Koorders'* own specimens 9714 β in the Calcutta Herbarium, is not *P. pyramidata*. We have, therefore, not quoted *Koorders & Valetton*. We agree with Sir D. Brandis ('*Indian Trees*,' 511) in thinking that *P. bengalensis*, *Clarke*, is probably only a narrow-leaved form of *P. pyramidata*.

A specimen bearing Father Scortechini's ticket, but without number and without any note of locality, appears to be *Premna acuminata*, R. Br. Prod. Nov.-Holl. 512; Benth. & Muell. Fl. Aust. V. 60, a North Australian species with long-petioled, cordate-ovate, deltoid, poplar-like leaves, and very loose panicles. It may very likely have been collected in a Botanic Garden.

A specimen collected by R. Derry at Bukit Borwang, Malacca, is too incomplete for identification. It may belong to *P. leucostoma*, Miq. Fl. Ind. Bat. II. 899.

8. GMEIINA, Linn.

Trees or shrubs, unarmed or armed with axillary divaricate spines (abortive branchlets). *Leaves* opposite, entire or more or less lobed. *Flowers* large, yellow or brownish-yellow, often tomentose, in dense or lax sessile or pedunculate cymes along the branches of a terminal panicle; bracts usually small, sometimes large, leafy and coloured. *Calyx* campanulate, 4- to 5-toothed or subentire, persistent and unaltered in fruit. *Corolla* obliquely campanulate or funnel-shaped; tube slender below, much dilated above; limb spreading, oblique, 4- to 5-lobed. *Stamens* 4 didynamous, inserted below the throat of the corolla, included; anthers pendulous, with oblong sub-separate cells. *Ovary* 4-celled, the cells 1-ovuled; style slender; stigma shortly 2-fid; ovules laterally attached to the septum at their middle or higher. *Fruit* a succulent drupe; endocarp bony, 2- to 4-celled, usually with a conical hollow in the middle open on one side. *Seeds* oblong; testa thin, with a corky layer outside; albumen none; cotyledons fleshy; radicle inferior. —DISTRIB. Species about 11, in India, Malaya, China and Australia.

Leaves glaucescent beneath with minute glands, usually 3- or more

lobed	..	..	..	..	..	1. <i>G. asiatica</i> .
Leaves fulvous-tomentose beneath, rarely lobed	..	..	..	..	..	2. <i>G. villosa</i> .

G. HYSTRIX, Schultes ex Kurz in Journ. As. Soc. XXXIX. ii. 81 (1870), and For. Fl. II. 265, is a large spinous scandent shrub with very large coloured bracts, a native of Siam and the Philippines, also, according to Kurz, Tenasserim. It is probably only a garden escape in Singapore (Garden road, Ridley 3944).

1. *GMEIINA ASIATICA*, Linn. Sp. Pl. 626 (1753). A much-branched spinous straggling shrub; bark yellowish-white; branchlets horizontal, rigid, puberulous, the smaller ones often becoming spines at their ends. *Leaves* membranous; ovate or elliptic or obovate, often 3- or more lobed, the midlobe the longest; upper surface glabrous, lower surface glaucescent from a coating of minute round glands, and villous on the nerves; margins entire except for the 3 or sometimes more lobes which point upwards; .75 to 1.5 in. long, .5 to 1 in. broad; midrib slender; main nerves 2 to 3 pairs; reticulations few; petiole very

slender, up to .5 in. long. *Racemes* fulvous-tomentose, terminal, 1 to 2 in. long; cymules very short; bracts small, caducous; pedicels very short flowers bright yellow. *Calyx* .15 to .2 in. long; tube with large flattened glands, otherwise pubescent; teeth 4, very small, triangular, acute. *Corolla* 2-lipped, obliquely funnel-shaped, puberulous without, nearly 2 in. in length; tube slender below, gradually inflated above; lobes 4, ovate, more or less rounded, the lowest the longest. *Stamens* curved, slightly exsert; filaments thickened, pubescent; anther-cells opening in a horseshoe, connective flattened, all 4 similar. *Ovary* depressed, glabrous; style slender, exsert; stigma 2-lobed. *Drupe* obovoid, yellow when ripe, .75 in. long; pyrene pyriform with a basal cavity, bony. *Seeds* usually 1 or 2 only, oblong at base; testa membranous with a corky covering; albumen fleshy. Roxb. Fl. Ind. III. 87; Lamk. Ill. t. 542; Wall. Cat. 1818 (*in part*); Schauer in DC. Prodr. XI. 679; Wight Ill. t. 174; Bedd. Fl. Sylv. CXXXII; Brandis For. Fl. 365; Blume Bijdr. 814; Miq. Fl. Ind. Bat. II. 866; Clarke in Hook. f. Fl. Br. Ind. IV. 582; Trimen Fl. Ceyl. III. 355; Cooke Bomb. Fl. II. 425; Prain Beng. Plants 829. *G. coromandeliana*, Burm. Fl. Ind. 132. *G. lobata*, Gaertn. Fruct. I. 268, t. 56, *excl. syn.* Rumph. *G. parvifolia*, Roxb. Cor. Pl. II. 32, t. 162; Wall. Cat. 2654; Schauer, *l. c.* *G. parviflora*, Roxb. Fl. Ind. III. 87. *G. inermis*, Blanco Fl. Filip. 493. *Michelia spinosa*, Amman. in Act. Petrop. VIII. 218, t. 18.

PERAK: *Scortechini*. SINGAPORE: *T. Anderson* 135; *Kurz*; *Kunstler* 102.—DISTRIB. India (Deccan Peninsula), Ceylon, Java, Borneo, &c.

2. *GMELINA VILLOSA*, Roxb. Hort. Beng. 46 (1814), and Fl. Ind. III. 86 (1832). A large straggling shrub or small tree with olive-coloured bark; branches spreading and drooping; branchlets round, villous; spines straight, axillary, .25 to .5 in. long. *Leaves* membranous when dry; ovate trapeziform, acute at apex, cuneate at base; upper surface pubescent when young, glabrous and dark-coloured when old; lower surface fulvous-tomentose; margins entire or sometimes obscurely lobed; 1 to 4 in. long, 1 to 2.5 in. broad; midrib slender, raised beneath; main nerves pubescent above, 3 to 4 pairs, the lowest pair from just above the base; transverse nervules slender, nearly horizontal; petiole slender, .75 to 1.5 in. long, channelled above. *Racemes* fulvous-tomentose, 1 to 2 in. long; cymules very short; bracts ovate-lanceolate, cuspidate, about .5 in. long, more or less leafy, deciduous when the flowers open; pedicels very short; flowers yellow. *Calyx* .15 in. long; tube with 3 or more large glands on the under side; teeth 4, small, triangular, acute. *Corolla*-tube slender below for nearly .5 in., then obliquely expanded for nearly 1 in., including the 4 lobes, the lowest of which is longest. *Anthems*, especially of longer pair of stamens, with the connec-

tive enlarged behind. *Style* slender, as long as the longer pair of stamens; stigma 2-lobed, lobes unequal. *Drupe* globose, yellow when ripe, fleshy, .75 in. in diam.; pyrene pyriform, .5 in. long, with a cavity opening on one side at the base; endocarp very hard, thick. *Seeds* usually 1 to 2 only fertile, compressed, acute at the ends; cotyledons fleshy, obcordate, .25 in. long; radicle very small. Jack in Mal. Misc. I. 17, and in Hook. Bot. Misc. I. 284; Wall. Cat. 1816; Schauer in DC. Prodr. XI. 679; Miq. Fl. Ind. Bat. II. 867; Clarke in Hook. f. Fl. Br. Ind. IV. 582; Koord. & Val. Bijdr. VII. 198. *G. asiatica*, Wall. Cat. 1818 (*in part*); Kurz For. Fl. II. 265 (*not of Linn.*). *Gmelina*, sp. n. 2, Griff. Notul. IV. 179. "*Radix deipara*," Rumph. Herb. Amb. II. 124, t. 39.

KEDAH: Langkawi Island, *Curtis*. PENANG: *Wallich* 1816; *Phillips*; *G. King*; *Curtis* 454. PERAK: *Wray* 734; *Scortechini* 740. MALACCA: *Griffith* 6057; *Maingay* (K.D.) 1189. SINGAPORE: *G. Thomson*; *Kurz*; *T. Anderson*; *Deschamps*; *Kunstler* 103.—DISTRIB. Burma (*Kurz*), Nicobars (*Kurz*), Siam, Java, Sumatra (*Forbes* 1576, 2642).

9. CLERODENDRON, Linn.

Trees or shrubs, sometimes straggling or climbing. *Leaves* opposite or rarely verticillate, simple, entire or dentate or angularly-lobed. *Flowers* small or large, of various colours, in axillary cymes or terminal panicles, often leafy below; bracts conspicuous or small; bracteoles 0 or very small. *Calyx* campanulate, rarely tubular, truncate, 5-toothed or almost 5-partite, persistent, often accrescent, often coloured in fruit. *Corolla* hypocrateriform or infundibular; tube usually long, slender; limb usually oblique, more or less 2-lipped, 5-lobed, the lobes spreading. *Stamens* 4 didynamous, long-exserted; filaments filiform, involute in the bud; anthers ovate or oblong, more or less uniform; cells parallel, adherent above, separate below; filaments attached at the notch. *Ovary* imperfectly 4-celled, the cells 1-ovuled; style filiform; stigma shortly bifid. *Fruit* a globose, succulent or rarely dry drupe, 4-grooved or 4-lobed, separating into 4 pyrenes, of which 1 to 3 are sometimes suppressed; exocarp usually fleshy; endocarp bony or crustaceous. *Seeds* oblong or pyriform; albumen 0; cotyledons thick, fleshy; radicle very small, inferior.—DISTRIB. 100 to 120 species, in the warm regions of both hemispheres, but chiefly in the eastern.

Corolla hypocrateriform, the tube rarely more than 1 in. in length (Subgenus 1. EUCLERODENDRON):—

Cymes axillary:—

Cymes few-flowered from most axils; leaves small; calyx-teeth very short 1. *C. neriifolium*.

- Cymes in deflexed, pedunculate, close panicles, from upper axils; leaves large; calyx-lobes linear-lanceolate, over .2 in. long 2. *C. deflexum*.
- Cymes in leafy panicles, the lower branches appearing axillary:—
- Leaves and inflorescence glabrous or only slightly puberulous; leaves usually over 1 in. broad, long-acuminate, membranous 3. *C. disparifolium*.
- Leaves and inflorescence scabrous-hispid, more or less pubescent; leaves under 1 in. broad, acute, chartaceous 4. *C. lankawiense*.
- Cymes in terminal panicles:—
- Leaves oblong or lanceolate:—
- Panicles more or less pendulous, long-pedunculate:—
- Leaves 1 to 3 in. broad; calyx-lobes lanceolate, acute 5. *C. penduliflorum*.
- Leaves 2 to 6 in. broad; calyx-lobes ovate, cuspidate 6. *C. umbratile*.
- Panicles erect, short-pedunculate or sessile:—
- Leaves entire; calyx cleft nearly to the base; stems fistular:—
- Leaves glabrous; main nerves distant; calyx-lobes acuminate with incurved tips 7. *C. myrmecophilum*.
- Leaves puberulous; main nerves rather close; calyx-lobes acute, glandular 8. *C. Curtisii*.
- Leaves serrate, rarely entire; calyx truncate; teeth minute 9. *C. serratum*
- Leaves ovate, usually cordate at base:— var. *Wallichii*.
- Panicles pyramidal, thyrsoid; leaves hairy:—
- Corolla-tube over .5 in. long; leaf-margins dentate 10. *C. infortunatum*.
- Corolla-tube under .3 in. long; leaf-margins entire 11. *C. villosum*.
- Panicles corymbose; leaves glabrous; corolla-tube over .75 in. long 12. *C. Colebrookianum*.
- Leaves usually 3 to 7-lobed, under surface prominently glandular 13. *C. paniculatum*.
- Corolla infundibuliform, the tube more than 1 in. in length
- (Subgenus 2. SIPHONANTHUS):—
- Leaves usually verticillate, lanceolate; panicle very long, many-flowered; drupe blue 14. *C. Siphonanthus*.
- Leaves opposite, elliptic or ovate; panicle short, few-flowered; drupe red 15. *C. Ridleyi*.

The following species are found in cultivation or as escapes from cultivation:—

CLERODENDRON FRAGRANS, R. Br. in Ait. Hort. Kew. ed. 2, IV. 63 (1812). A double-flowered shrub, with large leaves of unpleasant odour, the flowers white merging into dark purple and fragrant.—SINGAPORE: *Deschamps*; *King's Collector* 304.

C. CALAMITOSUM, Linn. Mant. 90 (1767). A slender white-flowered shrub, native of Java and often found in gardens. In the Fl. Br. Ind. it has been described as a Malacca species on the authority of Maingay's specimen, but Mr. Ridley informs us that in his opinion the plant is not indigenous and that Maingay's specimen came, in all probability, from a garden escape.

C. THOMSONÆ, Balf. f. in. Trans. Bot. Soc. Edinb. VII. 265, t. 7, and 580, t. 16 (1863). A climbing shrub, native of Tropical Africa, with opposite ovate leaves and terminal lax cymes of flowers with a white calyx and crimson corolla.—PENANG: *Curtis* 124. SINGAPORE: *Deschamps*.

C. SQUAMATUM, Vahl Symb. II. 74 (1791). An erect shrub, native of India, China, and Sumatra, with ovate cordate leaves and scarlet flowers in large panicles.—SINGAPORE: *Ridley* 9209.

1. *CLERODENDRON NERIIFOLIUM*, Wall. Cat. 1789 (1828). A straggling shrub; branches ashy-grey, lenticellate; branchlets slender, greyish-brown. *Leaves* membranous, ternate or opposite; elliptic, acute or rounded often slightly emarginate at apex, shortly attenuate at base; glabrous, or, when young, sparsely pubescent on both surfaces; margins entire; 1·5 to 3·5 in. long, .75 to 1·75 in. broad; midrib slender; main nerves about 5 pairs, straight or branched to meet in an obscure looped intramarginal nerve; reticulations finely netted; petiole slender, .25 to .5 in. long. *Cymes* axillary, umbellate, sometimes in a 7-flowered dichasium, often only 3-flowered; peduncle 1 to 1·5 in. long; bracts linear, setaceous; bracteoles similar but smaller; pedicels .15 to .25 in. long; flowers white, purplish-pink (*Forbes*). *Calyx* tubular-campanulate, enlarged in fruit and then cup-shaped; tube .15 in. long, pubescent and gland-dotted without; teeth 5, minute. *Corolla*-tube very slender, .75 to 1 in. long; gland-dotted without, villous within; lobes 5, spreading, unequal, somewhat oblong, about .25 in. long. *Stamens* red, long-exserted; anther-cells oblong, parallel. *Ovary* cylindric, obtuse; style very slender; stigma shortly bifid. *Drupe* obovoid, .5 in. long, 4 in. in diameter; top depressed; exocarp spongy; pyrenes 4 readily separating, endocarp crustaceous. *Seed* obovoid; testa thin; cotyledons oblong, thick, fleshy; radicle very short, thick. Schauer in DC. Prodr. XI. 660; Miq. Fl. Ind. Bat. II. 839; Clarke in Hook. f. Fl. Br. Ind. IV. 589; Prain Beng. Plants 835. *C. inerme*, Benth. Fl. Hongk. 271, and Fl. Austral. V. 61; Schauer l. c. (*in part*); Wall. Cat. 1788, Sheet 1 or A. *C. inerme* var. *neriifolia*, Kurz For. Fl. II. 266. *Volkameria neriifolia*, Roxb. Fl. Ind. III. 64. "*Jasminum litoreum*," Rumph. Herb. Amb. V. t. 46.

KEDAH: in Langkawi Island, *Curtis* (*Hamad*). PENANG: at Batu Ferengy, *Curtis* 2782; (or SINGAPORE), *Wallich* 1788, 1. PERAK: at 1037

Krian, *Scortechini* 1382. MALACCA: *Griffith* (K.D.) 6056, 1; on swampy ground near the sea, *Maingay* (K.D.) 1188. JOHORE: *G. King*. SINGAPORE: *Kunstler* 59; *Hullett* 143; seashore, *Deschamps*.—DISTRIB. India (Chittagong at Mascal Island), Burma (Arracan and Tenasserim coasts), Sumatra (*Forbes* 1802), Borneo (*Haviland* 1018, 3555), Siam, Philippine Islands, China, Australia, Polynesia.

A coast plant, similar to *C. inerme*, Gaertn., of the coasts of India, and considered by some to be a variety of it. It is distinguished by the leaves of different shape and texture, the smaller and more slender and glandular corolla, and the larger drupe. The leaves are sometimes lanceolate (see Roxb. Ic. No. 2524).

2. *CLERODENDRON DEFLEXUM*, Wall. Pl. As. Rar. III. 10, t. 215 (1832), and Cat. 1808. A shrub, reaching in height 4 ft. (*Wallich*), 4 to 6 ft. (*Kunstler*); branches obscurely quadrangular, furrowed, pubescent, pale-brown. Leaves opposite, membranous when dry; variable in shape, elliptic oblong-obovate or oblanceolate, cuspidate-acuminate at apex, rounded or cuneate at base; upper surface slightly pubescent when young, afterwards glabrous except on the nerves; lower surface softly pubescent, at length glabrate; margins entire or slightly undulate repand; 6 to 16 in. long, 2 to 6 in. broad; midrib strong, prominent beneath, pubescent; main nerves 10 to 16 pairs, prominent beneath, the lowest pair from the base at an acute angle, the rest curving upwards to and along the margin; transverse nervules rather regular and conspicuous in old leaves; reticulations netted; petiole 1 to 2.5 in. long, pubescent, swollen above and below, channelled on the upper side. Panicles corymbose, axillary in the ultimate or penultimate axils of the branches, usually deflexed at right angles to the branch; peduncles 1 to 8 in. long, with 1 or 2 pairs of bracts like small leaves along them; bracts of the inflorescence lanceolate; corymbs crowded with single flowers or short trichotomous cymes, very many-flowered; bracteoles many, linear; peduncles, bracts, branches and calyx all red when fresh; buds clavate; flowers white tinged with pink. Calyx-tube very short, scarcely .1 in. long; lobes linear-lanceolate, erect, pubescent, .2 to .3 in. long; fruiting calyx enlarged and stellately spreading. Corolla-tube very slender, .5 to .75 in. long, glabrous; lobes subequal, spreading, spatulate, up to .25 in. long. Stamens long-exsert, filaments very slender, glabrous, anthers oblong; cells parallel. Ovary rounded, obtuse; style very slender; stigmatic branches short. Drupe purple, globose, depressed, smooth, with 4 or fewer pyrenes; pyrenes pyriform, .35 in. long, .25 in. broad; endocarp crustaceous, reticulate; seeds conform to the pyrenes; testa membranous;

cotyledons unequal, fleshy; radicle very small. Schauer in DC. Prodr. XI. 665; Miq. Fl. Ind. Bat. II. 875; Clarke in Hook. f. Fl. Br. Ind. IV. 593.

PENANG: Porter (*Wallich* 1808A); Curtis 81. PERAK: at Gunong Ijuk, &c., *Scortechini* 433, 1230; at Tapa, Waterfall, Maxwell's Hill, &c., *Wray* 1359, 1414, 2661, 3231, 4203; at Goping, Bukit Bingarang, &c., *King's Collector (Kunstler)* 168, 307, 1875, 6818. MALACCA: *Cuming* 2368; *Griffith*; *Maingay* (K.D.) 1185; *Hullett* 404; at St. John's Hill, *Hervey*; at Ayer Punas, *Derry* 296. JOHORE: *G. King*. SINGAPORE: *Wallich* (cf. Pl. As. Rar.); *Walker* 257, 288; *G. King*.

3. CLERODENDRON DISPARIFOLIUM, Blume Bijdr. 809 (1826). A shrub or small tree, reaching sometimes 20 ft. or more in height; branches pale brown, lenticellate, obscurely quadrangular; branchlets similar, slender, puberulous. *Leaves* membranous, the pairs more usually equal but occasionally unequal in size; oblong- or elliptic-lanceolate, long-acuminate at apex, acuminate or acute occasionally almost rounded at base; glabrous and pale on both surfaces except sometimes on the midrib beneath; margins entire or undulate, or obscurely toothed; variable in size as in shape, 2 to 7 in. long, .75 to 2.5 in. broad; midrib slender; main nerves 5 to 7 pairs, the lowest from close above the base and at about 20° to 30° with the midrib, the rest distant, starting at 50° to 60° with the midrib and curving upwards to near the margin, the upper ones joining in an intramarginal looped nerve; reticulations distant, transverse, not prominent; petiole slender, variable, .5 to 2.5 in. long, often twisted at base. *Cymes* puberulous, in lax spreading terminal or axillary brachiate panicles; the branches slender, repeatedly trichotomous; terminal ones sometimes up to 6 in. long, axillary ones about 2 to 3 in. long; peduncles very slender; bracts linear, usually about .25 in. long, those of main branches sometimes leafy, caducous after flowering; pedicels filiform, .25 to .5 in. long; buds clavate; flowers pale yellow. *Calyx* reddish; tube campanulate, about .1 in. long; lobes as long as tube, triangular, acute, prominently nerved; the calyx enlarged in fruit to about .5 in. long, with dark red reflexed lobes. *Corolla*-tube slender, .5 to .75 in. long, glabrous without, puberulous within; lobes 5, subequal, spatulate, .2 to .25 in. long. *Stamens* exsert. *Ovary* glabrous; style as long as stamens; stigma shortly bifid. *Drupe* globose, succulent, .25 in. in diameter. *Seeds* usually 2 fertile, ovoid; testa thin, wrinkled; cotyledons thick, fleshy; radicle minute. Schauer in DC. Prodr. XI. 672; Hassk. Retzia i. 57; Miq. Fl. Ind. Bat. II. 871; Clarke in Hook. f. Fl. Br. Ind. IV. 589; Koord. & Val. Bijdr. VII. 212. *C. acuminatum*, Wall. Cat. 1792; Schauer l.c. 662; Miq. l.c. 869. *C. Jackianum*, Wall. Cat. 1794, and in Hook. Bot. Misc. I. 284

(note to *C. nutans*, Jack); Bot. Mag. t. 3049 (*in note*); Schauer l.c., 664; Miq. l.c. 872.

KEDAH: at Pulau Songsong, *Curtis*. PENANG: at Penara Bukit, *Curtis* 1539. PERAK: *Wray* 1352, 2841; *Curtis* 2043, 3196, 3333; *King's Collector* 751, 879, 2301, 4130, 4331, 4332, 5197?, 8772; *Scortechini* 297, 314, 922. DINDINGS: Pangkore, *Scortechini* 1011; *Curtis* 1638. SELANGOR: *Curtis* 3778. MALACCA: *Griffith*; *Harvey*; *Cuming* 2378, 2395; *Ridley* 378; *Derry* 414; *Holmberg* 810; *Goodenough* 1773. JOHORE: *Cantley* 19. SINGAPORE: *Wallich* 1792 c; *Lobb*; *Ridley*; *G. King*; *Maingay* (K.D.) 1186; *Deschamps*; *Murton* 93; *Walker* 54; *Kunstler* 1, 119.—DISTRIB. Malay Archipelago.

4. CLERODENDRON LANKAWIENSE, King & Gamble in Kew Bull. 110 (1908). A shrub; branchlets scabrid-puberulous, obtusely quadrangular, channelled. *Leaves* chartaceous, opposite; oblong-lanceolate or oblanceolate, acute at apex, attenuate at base; both surfaces sparsely glabrous-hispid, pubescent on the nerves beneath; margins entire; 3 to 4 in. long, .5 to 1 in. broad; midrib stout; main nerves 8 to 10 pairs, curving acutely upwards to and along the margin; transverse nervules few, irregular; reticulations netted; petiole .25 in. long, scabrid-pubescent. *Panicle* leafy, terminal, pyramidal, thyrsoïd, reaching 10 in. in length and 4 in. in diam., scabrid-pubescent; branches at about 1 in. intervals, pedunculate, ending in rather few-flowered trichotomous cymes; bracts leaf-like, lanceolate; bracteoles small, setaceous; pedicels slender, about .2 in. long; buds clavate up to .75 in. long. *Calyx* campanulate, scabrous-hispid without, glabrous and with large peltate glands within, cleft about two-thirds down, prominently nerved; lobes ovate, acute, .2 to .25 in. long, .1 in. broad at base. *Corolla*-tube slender, pubescent, cylindric, .5 in. long; lobes spreading, obovate, the midlobe of the lower lip longer than the rest. *Stamens* long-exsert; filaments very slender, glabrous; anthers oblong, .075 in. long; cells parallel. *Ovary* rounded, obtuse; style very slender; stigmatic lobes very short. *Fruit* not seen.

KEDAH: at Terutau on Langkawi Island, *Curtis* 3789.

Only one specimen of this species is available. It is near *C. Griffithianum*, Clarke, but differs in the inflorescence, calyx, &c.

5. CLERODENDRON PENDULIFLORUM, Wall. Cat. 1795 (1828). A shrub; branchlets pale-brown, pubescent, quadrangular. *Leaves* membranous, opposite or ternate; ovate or lanceolate or oblong-lanceolate, long-acuminate at apex, acute at base; glabrous on both surfaces, glaucescent on the lower; margins entire or sometimes crenulate; 5 to 8 in. long, 1 to 3 in. broad; midrib slender; main nerves 5 to 7

pairs, distant, at once curving upwards to and along the margin; reticulations distant, obscure; petiole .5 to 2 in. long, slender, channelled. *Panicle* elongate, very lax, usually pendulous, glabrous or puberulous, long-pedunculate, reaching about 15 in. in length and up to 4 in. in greatest diameter; branches distant, opposite, bearing few-flowered umbellate cymules on slender peduncles .5 to 1 in. long; bracts linear, subulate, .15 to .2 in. long; pedicels slender, .1 to .15 in. long; flowers white; the rachis and calyx red. *Calyx* glabrous, deeply lobed; tube .1 in. long; lobes oblong-lanceolate, acute, .3 in. long; somewhat enlarged, reddish and reflexed in fruit. *Corolla*-tube funnel-shaped, curved, slender, .5 in. long, slightly glandular-pubescent; lobes oblong-spathulate, rounded, the 2 lower slightly emarginate, about as long as the tube. *Stamens* exsert; anther-cells incurved so as slightly to overlap. *Ovary* cylindric, truncate; style slender; stigma shortly 2-fid. *Drupe* fleshy, globose, .25 to .35 in. in diam.; pyrenes 4, thin-walled. *Seed* usually one only; testa membranous, rugose; cotyledons thick, fleshy. Schauer in DC. Prodr. XI. 664; Clarke in Hook. f. Fl. Br. Ind. IV. 591; Bot. Mag. t. 3049 (*in note*).

PENANG: at Penara Bukit and base of Penang Hill, *Ridley* 6947, 7181; *Curtis*; *Deschamps*. PERAK: at Batu Kuran, *Scortechini* 1612. SELANGOR: Caves, Gua Batu, *Ridley* 8212.—DISTRIB. Burma (Arracan (*Kurz*), Tenasserim (*Helfer* (K.D.) 6047), Tavoy (*Wallich* 1795)), Nicobar Islands.

6. CLERODENDRON UMBRATILE, King & Gamble in Kew Bull. 110 (1908). A shrub or small tree, reaching 8 to 15 ft. in height; branchlets pale-brown, smooth, fistular. *Leaves* membranous; variable in shape, usually oblong or obovate or oblanceolate, the broadest part about two-thirds up or even higher, long and rather suddenly acuminate at apex, usually rounded but sometimes attenuate at base; glabrous on both surfaces; entire; 8 to 16 in. long, 2 to 6 in. broad; midrib rather slender; main nerves 8 to 12 pairs, slender, the lowest pair usually from the base at an acute angle with the midrib, the rest at a wider angle curving upwards, the upper ones joining in a looped intramarginal nerve; transverse nervules irregular; reticulations netted; petiole 1 to 3 in. long, flaccid. *Panicles* from the uppermost axils, elongate, lax, somewhat curving, glabrous, usually 4 to 6 in. long and about 3 in. broad, on slender peduncles 4 to 7 in. long; branches divaricate, usually at right angles, with few-flowered cymules; rachis flattened and slightly winged; bracts leafy, lanceolate, up to 1 in. long; bracteoles many, linear-setaceous; pedicels slender, puberulous, .1 to .5 in. long; buds spathulate, curved, 1 in. long; flowers rather large, white tinged with pink; the calyx white or pale green turning red in fruit. *Calyx* large, glo-

bose or slightly puberulous, deeply divided nearly to the base; lobes ovate-acuminate, cuspidate, about .6 in. long by .25 in. broad, enlarging in fruit to 1.5 in. in diam., and then spreading. *Corolla*-tube slender, cylindric, .4 to .6 in. long; lobes spathulate, rounded at top, as long as tube. *Stamens* exsert; filaments glabrous; anthers .1 in. long; cells parallel. *Ovary* rounded, obtuse; style very slender; stigmas 2, short. *Drupe* black, smooth, fleshy, globose, .5 in. in diam.; pyrenes 4 or less, triangular-convex; endocarp crustaceous. *Seeds* rounded, .25 in. in diam.; testa membranous; cotyledons fleshy; radicle minute.

PERAK: at Kapayong Kinta, *Wray* 167; in dense jungle up to 3500 ft., *King's Collector* 722, 6959, 8268; *Scortechini* 2198; on Larut Hills, 3000 ft., and in Thaiping Hills, *Derry* 3704 (*Curtis*), 10712; at Kwala Dipang, *Curtis* 3116; at Bujong Malacca, *Ridley* 9700.—*DISTRIB.* Sumatra (in deep shade of forest at Grenoeng Trang and Kotta Djawa, *Lampongs*, *Forbes* 1333, 1585).

Ridley's No. 7594, from Ginting Bidai, Selangor, appears to be this species, but the leaves are rather narrower than usual and reach 12 in. long by 2.5 in. broad. The specimen is in fruit, which Ridley describes as black with a red calyx.

7. *CLERODENDRON MYRMECOPHILUM*, Ridley in Journ. Bot. XXXIII. 42 (1895). A sparingly branched shrub, about 3 ft. high; stem stout, terete, glabrous, fistular, the bark white; internodes swollen, hollow. *Leaves* opposite or alternate, membranous when dry; oblong, elliptic-oblong or oblanceolate, acute or obtuse at apex, acute obtuse or cordate at base; both surfaces glabrous, dull; margins entire; 6 to 12 in. long, 2 to 4 in. broad; midrib stout, broad, pale on the upper surface; main nerves 10 to 13 pairs, curving very gently upwards to meet in a looped intramarginal nerve; transverse nervules very few, irregular; reticulations not visible; petiole 7.5 to 2.5 in. long, fistular. *Panicle* a terminal, shortly peduncled, pubescent, pyramidal thyrsus reaching 10 in. long and 3 to 4 in. broad; branches usually opposite, spreading, of rather few-flowered loose reddish-brown cymes; bracts and bracteoles linear-subulate, caducous reddish-brown; pedicels .15 to .2 in. long; buds clavate, curved; flowers ochreous-red. *Calyx* puberulous, about .3 in. long, cleft nearly to the base; lobes erect, lanceolate acuminate with incurved tips; fruiting calyx enlarged to about 1 in. in diam; lobes triangular-acuminate, reflexed, red. *Corolla*-tube cylindric, about .5 in. long, puberulous without; lobes as long as tube, obovate-oblong; the tips rounded. *Stamens* long exsert; filaments very slender, red; anthers oblong-reniform, .05 in. long; cells parallel. *Ovary* glabrous, obtuse; style as long as stamens, red; stigmatic branches slender. *Drupe*

globose, black, .5 in. in diam., with 4 to 1 pyrenes; pyrenes convex on back, nearly plane on the face, 3-ribbed, .3 to .4 in. long. *Seed* conform with the pyrenes; testa membranous; cotyledons thick, fleshy, unequal; radicle minute. Bot. Mag. t. 7887; Gard. Chron. XXXIII. Ser. 3, 196 (1903), and XXXV. Ser. 3, 237, t. 98 (1904).

JOHORE: at Jaffaria, *G. King*. SINGAPORE: in dense wet woods at Choa-Chu-kang, Ridley.

The hollow stems are swollen at the internodes, and there form nests for ants belonging to the genus *Pheidole*, Fabricius. The same phenomenon occurs in *C. fistulosum*, Becc., of Borneo, in *C. formicarum*, Gürke, a native of Tropical Africa (Hook. f. in Bot. Mag. l. c.), and in the next species here described.

8. CLERODENDRON CURTISII, H. H. W. Pearson in Kew Bull. 142 (1901). A small shrub, usually 2 to 3 ft., sometimes reaching 6 ft. high; stem thick, fistular, striate, minutely puberulous. *Leaves* opposite, membranous; elliptic, elliptic-oblong or -obovate, acuminate at apex, broadly cuneate rounded or sometimes slightly cordate at base; both surfaces somewhat puberulous, upper glabrescent when old; margins entire or undulate-denticulate; 4 to 12 in. long, 3 to 6 in. broad; midrib stout, pubescent; main nerves 9 to 12 pairs, curving upwards to and along the margin where they anastomose; transverse nervules fairly regular and prominent; reticulations inconspicuous; petiole thick, striate, puberulous, 1 to 4.5 in. long. *Panicles* terminal, thyrsoid, pubescent, much-branched, reaching 6 to 8 in. long and 4 to 5 in. broad; the rachis and branches angular; branches opposite, with peduncles .75 to 1 in. long and corymbose cymes of many flowers; bracts leafy, the lower large, the upper obovoid or spatulate; bracteoles small, subulate; pedicels slender, .15 in. long; buds clavate, .5 to .75 in. long; flowers bright yellow, tinged with red; the calyx crimson. *Calyx* cleft three-quarters down; lobes lanceolate, acute, 3-nerved, pubescent, ciliate, .25 in. long, .1 in. broad, with usually several rather obscure peltate glands. *Corolla*-tube cylindric, slender, .5 to .7 in. long, puberulous, glandular; lobes obovate or elliptic, narrow at the base, .2 to .3 in. long. *Stamens* long-exsert; filaments glabrous; anthers reniform, under .05 in. long; cells parallel. *Ovary* glabrous, obtuse; style very slender; stigmatic branches short. *Drupe* not seen.

PERAK: at Kota, Wray 3246; Lamjibus, Scortechini 1555; on Larut Hills, 3000 ft., Derry (Curtis) 3704; in low swampy places at Larut, King's Collector (Kunstler) 1966, 2507. DINDINGS: Bruas, in damp places, Curtis 3441. SELANGOR: Klang, Ridley 10198.

Mr. Ridley informs us that this is the same plant as *Clerodendron breviflorum*, Ridley in Journ. Bot. XXXII. 43 (1895), which was described from specimens

collected at Kampong Chin-Chin, Ulu Batu Pahat, Johore, by Lake & Kelsall in 1892. Unfortunately, there are no specimens in the herbaria at Kew or Calcutta, so we hesitate to alter the name. If the identification proves correct, it is Ridley's name that must take precedence. This is one of the species whose fistular stems contain ants' nests. *C. macrophyllum*, Hook. MS. in Herb. Kew, a large-leaved, handsome species from Java and Borneo, is very closely allied to this species.

9. *CLERODENDRON SERRATUM*, Spreng. Syst. Veg. II. 758 (1825); Don Prodr. Fl. Nep. 103; Wall. Cat. 1809; Ham. in Trans. Linn. Soc. XVII. 187; Schauer in DC. Prodr. XI. 664; Dalz. & Gibs. Bomb. Fl. 200; Wight Ic. t. 1472; Brandis For. Fl. 364; Kurz For. Fl. II. 267; Blume Bijdr. 810; Miq. Fl. Ind. Bat. II. 873; Clarke in Hook. f. Fl. Br. Ind. IV. 592; Trimen Fl. Ceyl. III. 360; Cooke Fl. Bomb. II. 432; Prain Beng. Plants 835. *C. ternifolium*, Don l.c. *C. macrophyllum*, Sims Bot. Mag. t. 2536; Reich. Fl. Exot. t. 209; Schauer l.c. 674. *C. ornatum*, Wall. Cat. 1811; Schauer l.c. 675. *C. herbaceum*, Wall. Cat. 1815; Schauer l.c. 675. *Volkameria serrata*, Linn. Mant. 90; Roxb. Fl. Ind. III. 62. *V. herbacea*, Roxb. Hort. Beng. 46.—DISTRIB. India, Burma, and Ceylon.

VAR. *Wallichii*, C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 592. A shrub, reaching 8 to 10 ft. in height (*Kunstler*); branches somewhat herbaceous, smooth, fistular; branchlets smooth, angled and with raised lines decurrent from the nodes. *Leaves* opposite, almost membranous when dry; obovate-lanceolate or oblanceolate, shortly acuminate at apex, acuminate narrowed at base; both surfaces glabrous; margins distantly serrate or denticulate, sometimes entire; 4 to 8 in. long, 1.5 to 3 in. broad; midrib strong, prominent beneath; main nerves 6 to 10 pairs, at first straight, then curving upwards to and along the margin; reticulations irregular; petiole up to about .6 in. long or none when bordered by the decurrent margins of the blade. *Panicle* terminal, erect, elongate, minutely pubescent, reaching 10 to 12 in. in length and 2 to 2.5 in. in breadth; the branches many, divaricate, subdichotomous, many-flowered; bracts foliaceous, large, ovate or obovate, acuminate or obtuse and apiculate; bracteoles many, lanceolate or finally linear; pedicels slender, about .1 in. long; buds spatulate, curved; flowers greyish-white to blue, the lower lobe darker than the rest. *Calyx* campanulate; lobes extremely short, rounded, minutely apiculate; the fruiting calyx cup-shaped, almost truncate, not enlarged. *Corolla*-tube cylindric, slightly narrowed below the oblique throat, .2 to .25 in. long, glabrous without, villous within; lips 2, upper of 2 oblong, flat, obtuse lobes, lower of 3 lobes, the side ones similar to the upper, the midlobe spatulate, concave, emarginate, all about .25 in. long. *Stamens* very long-exsert, much curved; filaments villous at the base and

thickened; anthers oblong, .075 in. long; cells parallel. *Ovary* glabrous, truncate at top; style very long, slender; stigmas 2, rather long. *Drupe* purple, succulent, when dry .25 in. long, and as much broad at top, with 4 (or less) well-marked pyrenes; pyrenes obovoid, plane or concave on inner faces; endocarp crustaceous. *Seeds* obovoid, .15 to .2 in. long, concave on the inner, convex on the outer face, which is wrinkled; testa thin; cotyledons fleshy, unequal, one convex, the other concave; radicle minute. *C. farinosum*, Wall. Cat. 1810 (not *Volkameria farinosa*, Roxb.). *C. divaricatum*, Jack in Mal. Misc. I. 2, and in Hook. Bot. Misc. II. 89; Schauer in DC. Prodr. XI. 674.

PERAK: Wray 1871; at Ipoh, Curtis 3198, 3328; at Ipoh and Baton Gaja, *Deschamps*; near Thaiping, *Scortechini* 507; at Goping, *King's Collector* (Kunstler) 480. SELANGOR: *Goodenough* 10478; *Cecil C. Smith*.—DISTRIB. India (Sikkim, Assam and Burma), Sumatra, Java, Celebes, Cambodia.

We have not followed Clarke in quoting *C. javanicum*, Walp. Rep. IV. 113, as we consider the description therein given does not sufficiently fit our specimens.

10. CLERODENDRON INFORTUNATUM, Linn. Sp. Pl. 637 (1753). A shrub, usually about 3 to 8 ft. high, occasionally a small tree, gregarious; branchlets obtusely quadrangular, slightly furrowed, clothed with yellowish pubescence. *Leaves* somewhat coriaceous; ovate, acuminate at apex, rounded or cordate at base; both surfaces roughly strigosely hairy, lower sometimes with small obscure round glands; margins dentate or denticulate, rarely entire; 4 to 10 in. long, 3.5 to 8 in. broad; midrib prominent; main nerves also prominent, about 8 pairs, the lowest two pairs near the base spreading, the rest gradually curving upwards, all joined by prominent transverse nervules which branch and anastomose; reticulations netted; petiole 1 to 4 in. long, densely pubescent. *Panicle* terminal, pyramidal, spreading, 6 to 12 in. long and broad, densely tawny-pubescent; the branches trichotomous, ending in many-flowered cymes; bracts leafy, ovate-lanceolate, deciduous; bracteoles lanceolate, also deciduous; pedicels slender, .25 to .5 in. long; buds clavate, rounded at top; flowers white, tinged with pink; the calyx red at the base (Ic. Roxb.). *Calyx* cleft nearly to the base, silky pubescent, often with scattered, large, round, peltate glands; the lobes lanceolate, acute, suberect, .3 to .4 in. long; fruiting calyx enlarged, crimson, reaching 1.5 in. in diam. when spread out. *Corolla* densely pubescent without; tube cylindric, slender, .5 to .75 in. long; lobes spreading, as long as the tube, the 2 upper somewhat spathulate, the 3 lower ovate, oblong, rounded. *Stamens* long-exsert; filaments glabrous; anthers oblong; the cells parallel. *Ovary* rounded, glabrous;

style slender; stigmas 2, short. *Drupe* nearly globose, shining, black, 3 in. in diam., with 4 to 1 pyrenes; pyrenes convex without; the endocarp crustaceous. *Seeds* conform to the drupe; testa membranous; cotyledons fleshy. Gaertn. Fruct. I. 271, t. 57, fig. 1; Lamk. Ill. t. 544; Wall. Cat. 1796; Schauer in DC. Prodr. XI. 667; Dalz. & Gibs. Bomb. Fl. 200; Wight Ic. t. 1471 (?); Bedd. Fl. Sylv. CLXXIII., and Anal. XXII. fig. 1; Brandis For. Fl. 363; Kurz For. Fl. II. 267; Miq. Fl. Ind. Bat. II. 876; Trimen Fl. Ceyl. III. 361; Clarke in Hook. f. Fl. Br. Ind. IV. 594; Cooke Fl. Bomb. II. 432; Prain Beng. Plants 835. *C. viscosum*, Vent. Jard. Malm. t. 25; Bot. Mag. t. 1805; Bot. Reg. t. 629. *C. cordatum*, Don Prodr. Fl. Nep. 103; Schauer l.c. 674. *Volkameria infortunata*, Roxb. Fl. Ind. III. 59. *Clerodendron*, Linn. Fl. Zeyl. 232; Burm. Thes. Zeyl. 66.

SIAMESE STATES: Poongah, Curtis 2949. SINGAPORE: Schomburgk 106.—DISTRIB. India, Burma, Ceylon, Java, Moluccas.

We have not quoted "*Peragu*," Rheede Hort. Mal. II. t. 25, which Clarke & Miquel consider to be this species. Schauer quotes it under *C. villosum*, and it seems to us to resemble that species more closely in the leaves and calyx. *C. villosum* has not hitherto been recorded from the Western Peninsula, but Gamble has specimens collected in the Wynaad region of the Nilgiris which seem to be it and not *C. infortunatum*. We do not feel very sure that the plant figured in Wight Ic. t. 1471 is not *C. villosum* rather than *C. infortunatum*.

11. CLERODENDRON VILLOSUM, Blume Bijdr. 811 (1826). A shrub, usually about 3 to 5 ft. high (10 to 15 ft., *King's Collector*; 15 to 20 ft., *Kurz*); branchlets stout, obtusely quadrangular, densely tawny-villous, channelled on the sides. *Leaves* chartaceo-coriaceous; ovate acuminate at apex, cordate or truncate at base, sometimes slightly cuneate; both surfaces tawny-villous or velvety tomentose, those of young leaves white-silky; margins entire; 4 to 8 in. long, 3 to 5 in. broad; midrib stout, prominent; main nerves 5 to 6 pairs, the lowest pair from the base spreading at right angles to the midrib with about 8 to 10 nerves from the lower side, the next pair from close above it curving upwards with also about 8 to 10 nerves from the lower side, the rest more distant and similarly curving; transverse nervules distant, pale; reticulations obscure; petiole 2 to 6 in. long, densely tawny-pubescent. *Panicle* terminal, pyramidal, thyrsoid, spreading, reaching 4 to 7 in. long and 6 in. broad, densely tawny-pubescent; branches long peduncled, ending in trichotomous cymes of rather few flowers; bracts leafy, ovate-lanceolate, acuminate, persistent; bracteoles many, small, lanceolate, deciduous; pedicels .1 to .2 in. long; buds short, clavate, rounded; flowers white or cream-coloured, tinged with red. *Calyx* cleft about

two-thirds down, with large prominent, scattered, rounded glands; lobes ovate-lanceolate, cuspidate-acuminate, .25 in. long; fruiting calyx white, much enlarged, nearly 1 in. in diam. when opened, completely embracing the fruit. *Corolla* villous; tube cylindric, .2 to .3 in. long; lobes obovate-oblong, as long as tube. *Stamens* long-exsert; filaments slender; anthers oblong-reniform; cells parallel. *Ovary* glabrous, obtuse; style slender, longer than the stamens; stigmatic lobes 2 very short. *Drupe* globose, shining, black when ripe (*King's Collector*), white (*Jack*), slightly succulent, with 4 to 1 pyrenes; pyrenes convex on the outer, flattened on the two inner, faces, .25 in. long; endocarp crustaceous, reticulate. *Seeds* oblong, curved, .15 to .2 in. long; testa thin; cotyledons fleshy, curved, somewhat unequal; radicle minute. Schauer in DC. Prodr. XI. 667; Kurz For. Fl. II. 268; Miq. Fl. Ind. Bat. II. 877; Clarke in Hook. f. Fl. Br. Ind. IV. 595. *C. molle*, Jack in Mal. Misc. I. 15, and in Hook. Bot. Misc. I. 283 (not of H.B.K.). *C. velutinum*, Wall. Cat. 1797. *C. trichotomum*, Wall. Cat. 6315 B (not of Thunb.).

PENANG: *Curtis* 101; roadsides on the hill, *Deschamps*; near top of the hill, *G. King*. PERAK: *Scortechini* 1389; in open forests, at 100 to 300 ft. alt., *King's Collector* (*Kunstler*) 5191, 5647, 8831. DINDINGS: Pangkore, *Scortechini* 63. MALACCA: *Griffith* 6051; *Main-gay* (K.D.) 1187; *Hervey*; *Derry* 148. SINGAPORE: *Cuming* 2415; *Wallich* 1797; *Murton* 124; *Schomburgk* 66; *Kurz*; *G. King*; *Deschamps*.—DISTRIB. Burma (Martaban, fide *Kurz*; Mergui, *Griffith*), Java, Sumatra, Philippines.

12. CLERODENDRON COLEBROOKIANUM, Walp. Rep. IV. 114 (1844). A large shrub, sometimes a small tree with silver-grey bark; branchlets glabrous, or the uppermost pubescent, quadrangular, furrowed below the leaf-petioles, more or less fleshy and soft; innovations tawny-pubescent. *Leaves* membranous when dry, opposite; broadly ovate, acute at apex, cordate at base, the sinus rather broad; both surfaces glabrous except the nerves beneath which are puberulous, a few large glands on the lower surface especially near the apex of the petiole; margins entire or sinuate; 5 to 12 in. long, 4 to 10 in. broad; midrib prominent; main nerves 8 to 10 pairs, the lowest pair from just above the petiole, with about 5 to 6 branch-nerves on the outer side, all spreading and curving only close to the margin; transverse nerves faint, as are the netted reticulations; petiole 2 to 8 in. long, cylindric, smooth. *Panicles* large, spreading, terminal, pubescent, reaching 1 to 2 ft. in diam.; branches long-peduncled, ending in corymbose, close, many-flowered cymes; bracts lanceolate, caducous; bracteoles many, lanceolate; pedicels short, .1 to .2 in. long; buds clavate, often 1 in.

long; flowers white to rose-purple. *Calyx* pubescent, .15 to .25 in. long, cleft half-way down; tube with often a large gland under each lobe; lobes triangular-lanceolate, acute; fruiting calyx scarcely enlarged. *Corolla*-tube cylindric, slender, nearly glabrous, .75 to 1 in. long; lobes elliptic or obovate, .25 in. long. *Stamens* long-exsert; filaments glabrous; anthers oblong-reniform, .075 in. long; cells parallel. *Ovary* glabrous, obtuse; style very long and slender; stigmatic lobes 2, short. *Drupe* glabrous, blue, .3 to .35 in. in diam. with usually 4 pyrenes. Schauer in DC. Prodr. XI. 672; Clarke in Hook. f. Fl. Br. Ind. IV. 594. *C. glandulosum*, Colebr. MS. ex Wall. Cat. 1806; *fide* Walp.; Lindl. in Bot. Reg. t. 19 (1844) *in note*; Schauer *l.c.*

SINGAPORE: *Lobb*.—DISTRIB. India (Sikkim, Assam, Burma). It is not quite certain that it is really indigenous in the Peninsula; *Lobb's* specimen may have been from a cultivated plant.

VAR. *Forbesii*, King & Gamble. Leaves and branchlets puberulous; panicles reduced to a terminal corymb of closely packed flowers 4 to 5 in. long; no glands on calyx or midrib of leaf; flowers dark scarlet.

Sumatra (near Kagoengan Ratoe, Lampongs, at 500 ft. alt., *Forbes* 1786).

13. CLERODENDRON PANICULATUM, Linn. Mant. 90 (1771). A shrub, reaching 4 to 6 ft. in height; branchlets quadrangular, channelled below the leaf-petioles, glabrous or puberulous, the bases of the leaves (as also the branches of the inflorescence) joined at the nodes by a belt of soft brown hairs. *Leaves* membranous; variable in shape, usually orbicular or ovate, from almost simple to deeply 3- to 7-lobed, cordate or hastate at base, acuminate at apex and at the apices of the lobes; upper surface sparsely hispid or glabrescent, lower pale and densely covered with round peltate glands; margins entire or minutely denticulate; 4 to 8 in. in diam.; midrib stout, ribs usually 3 pairs radiating from the base, the lower deflexed; main nerves of middle lobe 5 to 6 pairs, of side lobes about the same but stronger on the lower side; reticulations slender, netted; petiole variable, 1 to 6 in. or more. *Panicles* terminal, thyrsoid, pyramidal, spreading, 4 to 12 in. long by 3 to 8 in. broad, with opposite branches bearing trichotomous cymes with racemose reddish branches, the rhachises channelled; bracts foliaceous, like the leaves but smaller; bracteoles small, linear, numerous, red; pedicels slender, red, .25 to .75 in. long; buds clavate, the head globose; flowers red, orange or almost white; the calyx red. *Calyx* divided nearly to the base; lobes oblong-lanceolate, acute, .15 to .2 in. long, much enlarged in fruit, stellate, the lobes closely embracing the drupe. *Corolla*-tube slender, cylindric, puberulous, .5 to .7 in. long; lobes nearly equal, elliptic, .2 to .4 in. long, patent. *Stamens* long exserted; filaments red, glabrous;

anthers oblong-reniform; cells parallel. *Ovary* glabrous, cylindric; style very slender; stigmatic branches short. *Drupe* obovoid, 1- to 4-pyrened (usually 1 only); pyrenes pyriform; endosperm crustaceous, reticulate. *Seeds* conform to the pyrene; testa membranous; cotyledons unequal, fleshy; radicle very small. Ait. Hort. Kew. ed. 2, IV. 64; Vahl Symb. II. 74; Bot. Reg. t. 406; Reichb. Fl. Exot. t. 208; Hassk. Pl. Jav. Rar. 488; Schauer in DC. Prodr. XI. 668; Blume Bijdr. 811; Miq. Fl. Ind. Bat. II. 879; Clarke in Hook. f. Fl. Br. Ind. IV. 593; Hook. f. Bot. Mag. t. 7141. *C. pyramidale*, Andr. Bot. Rep. t. 628; Wall. Cat. 1802. *C. splendidum*, Wall. Cat. 1803. *Volkameria angulata*, Lour. Fl. Cochinch. 389.

KEDAH: on low ground near sea-level, *King's Collector* (Kunstler) 1792. PENANG: Wallich 1802; at Tanjong Bunga, Curtis 313. PERAK: Wray 42, 2435; at L. W. Resthouse, Scortechini 915; at Ipoh, Deschamps; at Larut, on rocks at 300 to 800 ft. alt., *King's Collector* 6437. SELANGOR: gap on Pahang side, at 2000 to 3000 ft. alt., Curtis 3759. MALACCA: Griffith 6050. SINGAPORE: Ridley; gardens, hedges, and waste places, Deschamps; Bukit Mandai, Goodenough.—DISTRIB. Siam (Hemsley in Journ. Linn. Soc. XXVI. 262).

14. CLERODENDRON SIPHONANTHUS, Br. in Ait. Hort. Kew. ed. 2, IV. 65 (1812). An erect, usually single-stemmed, little-branched shrub, reaching 4 to 8 ft. in height; branchlets channelled, smooth-barked. *Leaves* membranous when dry, verticillate, 3- to 5-nate or opposite, the bases of the petioles joined by a pubescent ring; narrowly lanceolate or oblong-lanceolate, shortly acuminate at apex, attenuate at base; both surfaces glabrous, the lower pale; margins entire or sinuate, recurved; 4 to 8 in. long, .5 to 1 in. broad; midrib prominent; main nerves 10 to 12 pairs, very short, straight, joining prominent looped intra-marginal nerves which start from the base; transverse nervules very few; petiole none or extremely short. *Panicle* terminal, thyrsoïd, leafy, reaching 8 to 18 in. in length, and 4 to 6 in. in diam.; branches red, verticillate, of lax peduncled few-flowered cymes; bracts linear-lanceolate, .5 in. long; bracteoles subulate; pedicels .5 to 1.5 in. long, puberulous; buds long, clavate; flowers white, changing to cream-colour. *Calyx* puberulous, divided three-fourths down; lobes ovate-lanceolate, acute, densely clothed within with minute round glands, .3 to .4 in. long, .15 in. broad; fruiting calyx greatly enlarged, leathery, up to 1.5 in. in diam., crimson. *Corolla*-tube funnel-shaped, glabrous, curved, 3 to 4.5 in. long, about .1 in. broad below, widening above; lobes spreading, obovate- or oblong-obtuse, .3 to .4 in. long. *Stamens* long exsert; filaments slender, glabrous; anthers oblong, .1 to .15 in. long; cells parallel. *Ovary* glabrous, obtuse; style very long, slender;

stigmatic branches short, rather thick. *Drupe* 1- to 4-lobed according to the number of pyrenes, about .5 in. in diam.; exocarp fleshy, dark blue; pyrenes rounded except a slight flattening on the inner side, smooth, .4 in. by .25 in.; endocarp crustaceous. *Seeds* conform to the pyrenes; testa thin, soft; cotyledons very fleshy; radicle very small. Wall. Cat. 1784; Wight Ill. t. 173; Schauer in DC. Prodr. XI. 670; Brandis For. Fl. 364; Dalz. & Gibs. Bomb. Fl. Suppl. 69; Miq. Fl. Ind. Bat. II. 883; Clarke in Hook. f. Fl. Br. Ind. IV. 595; Cooke Fl. Bomb. II. 433; Prain Beng. Plants 836. *C. verticillatum*, Don Prodr. Fl. Nep. 102; Schauer l.c. 671. *Siphonanthus indica*, Willd. Sp. Pl. I. 606; Lamk. Ill. t. 79, fig. 1; Roxb. Fl. Ind. III. 67. *S. angustifolia*, Willd. l.c. *Ovieda mitis*, Burm. Fl. Ind. 136, t. 43, figs. 1, 2.

PERAK: at Trong, Wray 3170.—DISTRIB. India, Burma, Java, Sumatra, Celebes, Siam (*Schomburgk* 302). Often cultivated in gardens.

15. CLERODENDRON RIDLEYI, King & Gamble in Kew Bull. 111 (1908). A small slender tree, reaching 15 ft. in height and 2 to 3 in. in diam.; branches smooth, pale brown; branchlets (also rachis of inflorescence) quadrangular, shining. *Leaves* opposite, membranous; elliptic, elliptic-lanceolate or ovate, caudate-acuminate at apex, rounded or cuneate at base; both surfaces glabrous, the lower pale; margins entire; 3 to 7 in. long, 1 to 3 in. broad; midrib slender, prominent beneath; main nerves 5 to 7 pairs, the lowest pair from close to the base at an acute angle with the midrib, the rest more spreading, meeting in a looped intramarginal nerve; transverse nervules few, irregular, other reticulations not visible; petiole slender, .75 to 2 in. long, winged by decurrent ridges from the base of the blade. *Panicle* terminal, few-flowered, reaching with the peduncle at most 6 in. long and 3 in. broad; branches divaricate, 1 to 1.5 in. long; bracts leafy, lanceolate, acuminate, caducous; bracteoles linear; pedicels slender, .25 in. long; buds very long, clavate; flowers white (*Ridley*) or pale yellow (*Kunstler*). *Calyx* erect, deeply divided; lobes glabrous, lanceolate, caudate-acuminate, .5 to .7 in. long, often with scattered large peltate glands; fruiting calyx enlarged, enclosing the fruit, 1.5 in. in diam. when opened out, deep red in colour. *Corolla*-tube cylindric, slightly funnel-shaped at top, 3 to 3.5 in. long, very slender; lobes obovate, obtuse, .5 in. long, subequal. *Stamens* long-exsert; anther-cells parallel. *Ovary* glabrous, obtuse, 4-lobed; style very long, slender; stigmatic lobes very short. *Drupe* deep red, smooth, globose, fleshy, .5 in. in diam. with 4 to 1 pyrenes; pyrenes pyriform, slightly ribbed; endocarp crustaceous. *Seeds* conform to the pyrenes; testa membranous; cotyledons very thick, fleshy.

PERAK: in dense forest near Larút, up to 300 ft., *King's Collector* 2944, 3988. SELANGOR: at Batu Tiga, *Ridley* 11862.

CLERODENDRON LOBBII, C. B. Clarke in Hook. f. Fl. Br. Ind. IV. 590 (1885), is a climbing shrub which, in all probability, does not belong to this genus. Mr. Ridley informs us that it is very common in Borneo, and that he thinks Lobb's specimen must have been collected at Kuching and not in Penang. It is a very handsome, striking plant, and has been cultivated. It has the upper leaves of the spray bright red, flowers of a light salmon-red, and a horn-shaped fruit about 2 in. long. There is a good picture of it in Miss North's Gallery at Kew, to which Mr. Ridley has drawn our attention.

10. VITEX, Linn.

Trees or shrubs. *Leaves* opposite, digitately 3- to 7-foliolate, sometimes 1-foliolate; leaflets usually entire, sometimes dentate, generally petiolulate. *Flowers* blue, white or yellow, in sessile or pedunculate cymes forming terminal or axillary or both terminal and axillary panicles or corymbs; bracts usually small, often caducous. *Calyx* campanulate or tubular funnel-shaped, usually truncate or shortly 5-toothed, sometimes bilabiate with 3 to 5 teeth. *Corolla* small, 2-lipped; tube long or short; upper lip usually of 2, lower of 3, lobes, the central lobe of the lower lip much the longest. *Stamens* 4 didynamous, usually exserted; anther-cells various, always attached at the tip only, generally parallel at first, afterwards divaricate. Ovary 2- to 4-celled, 4-ovuled; style filiform; stigma bifid. *Fruit* a globose or ovoid or obovoid drupe; supported by the more or less enlarged calyx; mesocarp generally fleshy; endocarp a bony pyrene, normally 4-celled and 4-seeded, but often with some of the cells suppressed, the base of the pyrene sometimes hollowed in a cavity. *Seeds* obovate or oblong; albumen 0; cotyledons usually fleshy; radicle inferior.—DISTRIB. About 120 species, in all tropical and warm temperate regions.

Inflorescence terminal, with occasional additional branches in the axils of uppermost leaves:—

Leaves without wings to the petioles:—

Shrubs or small trees; leaves membranous, grey-pubescent beneath:—

Leaves 1- to 3-foliolate; margins entire; petiole under 1 in. long; calyx under .1 in. long ..

1. *V. trifolia*.

Leaves 3- to 5-foliolate; margins sometimes crenate; petiole over 1 in. long; calyx over .1 in. long ..

2. *V. Negundo*.

Trees; leaves chartaceous or coriaceous, not grey-pubescent beneath:—

Leaves 1-foliolate, coriaceous:—

Leaves 1.5 to 4.5 in. broad, with a prominent intramarginal nerve; panicle-branches spicate ..

3. *V. holophylla*.

- Leaves 2 to 3 in. broad, no prominent intramarginal nerve; panicle-branches racemose 4. *V. Clarkeana*.
- Leaves 3-foliolate; leaflets petiolulate:—
- Leaves coriaceous; inflorescence of stout panicles up to 8 in. long, the flowers clustered 5. *V. coriacea*.
- Leaves chartaceous; inflorescence of slender panicles, the flowers not clustered 6. *V. siamica*.
- Leaves 3- to 5-foliolate, chartaceous or coriaceous:—
- Leaflets sessile or subsessile; inflorescence densely tawny-pubescent; bracts large, conspicuous .. 7. *V. pubescens*.
- Leaflets petiolulate; inflorescence thinly cinereous-tomentose; bracts very small or none:—
- Leaflets long-acuminate; panicle-branches slender, with few-flowered cymules; corolla-tube without a ring of hairs within 8. *V. heterophylla*.
- Leaflets short-acuminate; panicle-branches stout, with many-flowered cymules; corolla-tube with a ring of hairs within 9. *V. sumatrana*
var. *urecolata*.
- Leaves with winged petioles, the wings broad:—
- Leaflets long-lanceolate, scabrous-dotted, under 2.5 in. broad 10. *V. pteropoda*.
- Leaflets elliptic or elliptic-obovate, over 3 in. broad, not scabrous-dotted 11. *V. per-alata*.
- Inflorescence axillary:—
- Leaves 3- to 5-foliolate, glabrate; cymes peduncled, reaching 4 to 5 in. long 12. *V. glabrata*.
- Leaves 3-foliolate; cymes sessile, under 1.5 in. long:—
- Leaves and cymes densely tawny-pubescent; drupe with a hard-ridged pyrene, having 3 to 4 seed-bearing cells above and an empty cavity below:—
- Calyx-lobes oblong-lanceolate, .25 in. long, conspicuous; bracts large, conspicuous; leaves large 13. *V. longisepala*.
- Calyx-lobes short, acute, inconspicuous; bracts minute, caducous; leaves small 14. *V. vestita*.
- Leaves glabrate; cymes sparingly fulvous-hairy; calyx 2-lipped 15. *V. gamosepala*.

We have not maintained Clarke's subgenus *Glossocalyx* because the species *V. gamosepala*, for which it was established, is so very nearly allied to *V. longisepala* and *V. vestita* that, if any subgenus were necessary, it ought to be one which would include these three, so different in inflorescence and fruit from the rest of the genus, and closely allied to *Premna* and *Gmelina*.

1. *VITEX TRIFOLIA*, Linn. Sp. Pl. 638 (1753). A shrub or small tree; bark smooth, pale grey; branchlets quadrangular, covered with an appressed hairy tomentum. *Leaves* membranous; 1- to 3-foliolate; the terminal leaflets sessile or very shortly petiolulate, the lateral leaflets sessile; leaflets elliptic or obovate, or almost orbicular (speci-

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ally when 1-foliate), obtuse or acute at apex, rounded or cuneate (especially the terminal, if 3) at base; upper surface glabrous, lower densely white-tomentose; margins entire; end leaflet 1 to 3 in. long, .5 to 1.25 in. broad, lateral leaflets smaller; main nerves 8 to 12 pairs, inconspicuous; petiole slender, .5 to 1 in. long. *Panicles* terminal, oblong, white-tomentose, reaching 1 to 5 in. in length; the rachis sub-quadrangular; cymes opposite, up to 1 in. long, brachiate; bracts linear, minute; flowers lavender to blue. *Calyx* sessile, campanulate, .075 to .1 in. long; tube ribbed from the teeth, white-tomentose; teeth 5, regular, acute, very small. *Corolla* .25 to .35 in. long; tube scaly-pubescent without, villous within at the insertion of the stamens; upper lip of 2 short rounded lobes, lower of 3 lobes, the lateral lobes .06 in. long, the midlobe longest, .125 in. long, villous, hairy within and usually incurved. *Stamens* exsert; filaments hairy-villous near the base; anther-cells curved. *Ovary* rounded, depressed, glandular-dotted. *Drupe* ellipsoid, depressed at top, .2 in. in diam., slightly ribbed, glandular-dotted, half-enclosed in the somewhat enlarged calyx. Linn. f. Suppl. 293; Lamk. Dict. II. 613; Roxb. Fl. Ind. III. 69; Bot. Mag. t. 2187; Wall. Cat. 1743; Schauer in DC. Prodr. XI. 683; Blume Bijdr. 812; Miq. Fl. Ind. Bat. II. 859; Benth. in Fl. Austral. V. 66; Bedd. Fl. Sylv. CLXXII; Brandis For. Fl. 370; Clarke in Hook. f. Fl. Br. Ind. IV. 583; Trimen Fl. Ceyl. III. 356; Cooke Fl. Bomb. II. 428; Prain Beng. Plants 833; Koord. & Val. Bijdr. VII. 200. *V. ovata*, Thunb. Fl. Jap. 257; Lamk. l. c.; Hook. & Arn. Bot. Beech. Voy. 206, t. 47. *V. repens*, Blanco Fl. Filip. 513. *V. incisa*, Wall. Cat. 1746 (partly, not of Lamk.). *V. Agnus castus* var., Kurz For. Fl. II. 269. "*Lagondium vulgare*," Rumph. Herb. Amb. IV. 48, t. 18. "*Caranosi*," Rheede Hort. Mal. II. t. 11.

PERAK: *Scortechini* 644, 1459. MALACCA: *Griffith*; *Maingay* (K.D.) 1206; *Hervey*. SINGAPORE: at Pulau Obun, *Kunstler* 57. —DISTRIB. India, Ceylon, Malay Archipelago, North Australia, Japan.

2. *VITEX NEGUNDO*, Linn. Sp. Pl. 638 (1753). A large shrub or small tree; bark thin, grey; branchlets quadrangular, covered with an appressed hairy tomentum. *Leaves* membranous; 3- to 5-foliate, the terminal leaflet petiolulate (up to .75 in. long), the lateral leaflets shortly petiolulate (usually about .25 in.), sometimes nearly or quite sessile; leaflets lanceolate, acuminate at apex, attenuate at base; upper surface nearly glabrous, lower densely white-tomentose; margins entire or sometimes coarsely crenate; end leaflet 2 to 4 in. long, .5 to 1.25 in. broad, lateral leaflets shorter; main nerves about 15 pairs with a few secondary nerves between; petiole slender, 1 to 1.5 in. long, white-tomen-

tose. *Panicles* 1 to 3 together, terminal, oblong-pyramidal, white-tomentose, reaching 12 in. long; the rachis quadrangular; peduncle of each branch variable, 1 to 4 in. long; cymes opposite, reaching 1 in. in length, but usually shorter, brachiate, at first dichotomous; bracts linear, short, the lowest somewhat leafy; flowers blueish-purple. *Calyx* sessile, campanulate; tube .1 to .15 in. long, faintly ribbed, enlarged in fruit; teeth regular, acute, .05 in. long, sometimes slightly cuspidate. *Corolla* .25 to .35 in. long; tube scaly-pubescent and slightly glandular without, villous within at the insertion of the stamens and on the midlobe of the lower lip; upper lip 2-lobed, lobes rounded, recurved; lower lip 3-lobed, the midlobe much the longest and obtuse at tip, lateral lobes spreading. *Stamens* exsert; filaments villous at the base; anther-cells curved. *Ovary* rounded, very slightly glandular. *Drupe* ovoid, depressed at top, .2 in. in diam., slightly ribbed, glandular-dotted. Roxb. Fl. Ind. III. 70; Wall. Cat. 1744; Schauer in DC. Prodr. XI. 684; Wight Ic. t. 519; Bedd. Fl. Sylv. CLXXI; Brandis For. Fl. 369; Miq. Fl. Ind. Bat. II. 890; Clarke in Hook. f. Fl. Br. Ind. IV. 583; Trimen Fl. Ceyl. III. 357; Cooke Fl. Bomb. II. 428; Prain Beng. Plants 833; Koord. & Val. Bijdr. VII. 201. *V. bicolor*, Willd. Enum. Hort. Berol. 660; Schauer l.c. 683; Dalz. & Gibs. Bomb. Fl. 201. *V. arborea*, Desf. Cat. Hort. Paris, 391. *V. paniculata*, Lamk. Dict. II. 612; Roxb. l.c. 71. "*Lagondium litoreum*," Rumph. Herb. Amb. IV. t. 19. "*Bemnosii*," Rheede Hort. Mal. II. t. 12.

PETANI: at Tomoh, *Machado* (Ridley 5813). MALACCA: *Griffith*. SINGAPORE: *Ridley* 4118. — *DISTRIB.* India, Ceylon, Malay Archipelago. *Ridley* thinks it is probably not really indigenous in the Peninsula.

3. *VITEX HOLOPHYLLA*, Baker in Kew Bull. 25 (1896). A small tree; branches with yellowish-white bark; branchlets also yellowish, shining, obtusely quadrangular; innovations tawny-tomentose. *Leaves* opposite, coriaceous, simple; ovate-lanceolate or ovate-oblong, acuminate at apex, rounded at base; both surfaces glabrous, upper olive-green, lower ferruginous; margins entire; 4 to 12 in. long, 1.5 to 4.5 in. broad; midrib stout, prominent, keeled above; main nerves 7 to 9 pairs at an angle of 70° with the midrib, curving upwards to meet in an intramarginal looped nerve, all slightly impressed above, raised beneath; secondary nerves many, irregular; reticulations prominent, netted; petiole .75 to 1.5 in. long, prominently jointed at both ends, younger ones puberulous. *Cymes* in terminal panicles of rather long glomerulate spikes reaching 6 to 7 in. long and 3 to 4 in. broad; densely tawny-tomentose when young, afterwards glabrate; bracts lanceolate or elliptic-lanceolate, caducous, .1 to .2 in. long; bracteoles 2, much smaller; flowers in each

glomerule about 3 on each side, sessile. *Calyx* campanulate, tawny-pubescent and glandular, .1 in. long; lobes 5 subequal, deltoid; calyx in fruit much accrescent, cup-shaped, truncate, .5 in. in diam. *Corolla*-tube funnel-shaped, pubescent and glandular without, sparsely villous within; 2-lipped, upper lip shortly 2-lobed, the lobes rounded, reflexed, lower lip 3-lobed, midlobe long, very villous within. *Stamens* exsert; filaments slightly villous; anther-cells divaricate, often recurved. *Ovary* rounded, villous at tip. *Drupe* globose or obovoid, .75 in. in diam., depressed at apex; pericarp crustaceous; cells 2; seed usually 1.

JOHORE: at Sungee Kaliang, *Ridley* 4031.—DISTRIB. Borneo (at Sandakan, *Governor Creagh*; *Lowe*; at Sarawak, *Beccari* 1111).

4. *VITEX CLARKEANA*, King & Gamble. A small shrubby tree, reaching about 15 ft. in height; branchlets pale brown, round, glabrous or puberulous. *Leaves* coriaceous, 1-foliolate; leaflet sessile, lanceolate or oblong-lanceolate, acuminate at apex, rounded at base; both surfaces glabrous, greyish when dry, the lower punctulate; margins entire, recurved; 6 to 12 in. long, 2 to 3 in. broad; midrib stout, very prominently raised on the lower, slightly on the upper surface; main nerves 12 to 20 pairs, irregularly but slightly curving to near the margin, where they sharply bend parallel to it, all but the few lowest joining in an intramarginal looped nerve; secondary nerves few between the main nerves; reticulations irregular, not transverse and not prominent; petiole .5 to .75 in. long, jointed at the base of the leaflet. *Panicle* terminal, puberulous, 12 to 18 in. long; peduncle stout, angled, 2 to 4 in. long; main branches usually 3, elongate, the middle one usually longest, bearing distant opposite corymbose cymes of rather large flowers; the cymes 1 in. rarely 2 in. long; bracts small, caducous; bracteoles minute; pedicels about .1 to .2 in. long, much thickened in fruit; flowers pale blue, the lip darker. *Calyx*-tube campanulate, tawny-pubescent, .125 to .15 in. long, much enlarged in fruit; lobes 5 irregular, short, acute. *Corolla*-tube .25 in. long, pubescent without and at the insertion of the stamens within, 2-lipped; upper lip shortly 2-lobed, lobes recurved; lower lip 3-lobed, the midlobe twice as long as the recurved sides-lobes, constricted below, spreading above, crenate, villous. *Stamens* exsert; filaments villous at base, thickened; anther-cells elliptic. *Ovary* globose, depressed, tawny-pubescent; style slender, as long as stamens; stigma shortly 2-lobed. *Drupe* ovoid, .3 in. in diam. or longer, tawny-pubescent; seed apparently 1 only. *V. simplicifolia*, Clarke in Hook. f. Fl. Br. Ind. IV. 586 (1885).

DINDINGS: Pangkore Island, *Curtis* 1611. PERAK: *Scortechini* 1383; at Telok Sera, *Ridley* 7990; in forest overlooking Bernam River, *King's Collector* 8788. MALACCA: *Griffith* (K.D.) 6064. JOHORE:

Lake & Kelsall on Sembrong River, 4059.—DISTRIB. Borneo (*Motley* 1269; *Beccari* 166; *Lobb, Haviland* 1580).

The name of this plant has had to be changed, as that of *simplicifolia* was already occupied by *V. simplicifolia*, Oliv. in Trans. Linn. Soc. XXIX. 133, t. 130 (1875), a Central African plant collected by the Speke & Grant Expedition.

5. *VITEX CORIACEA*, Clarke in Hook. f. Fl. Br. Ind. IV. 586 (1885). A tree, reaching 60 ft. or more in height and 15 to 20 in. in diam.; branches slender with greyish-brown fissured bark; branchlets pale brown, obscurely quadrangular, striate, puberulous. *Leaves* coriaceous, 3-foliolate; leaflets petioluled, entire, lanceolate or oblanceolate, obtuse or acute at apex, long-attenuate at base; both surfaces glabrous, upper shining, lower dull, minutely glandular, prominently reticulate; 3 to 5 in. long, 1 to 2 in. broad, the midlobe only slightly longer than the others; midrib prominent; main nerves 6 to 7 pairs, curving upwards to and along the margin where they anastomose, joined by prominent but irregular netted reticulations all raised on the lower surface; petiole 1 to 2 in. long, puberulous, angular, the apex swollen, petiolule of mid-leaflet about .5 in. long, of the side ones about .25 in. *Panicles* terminal, strict, sessile, minutely fulvous-puberulous, reaching 6 to 8 in. in length and 3 to 4 in. in breadth; branches many, elongate, ascending, subquadrangular; the main peduncles often 3 in. long or more; the flowers in small often distant clusters; bracts small, linear; flowers violet or blue. *Calyx* funnel-shaped, fulvous-pubescent, enlarged and cup-like in fruit; tube .1 in. long; lobes 5, rounded, .05 in. long. *Corolla* 2-lipped; tube fulvous-pubescent without except at the base, as also within at the insertion of the stamens, .25 in. long; upper lip 2-lobed, lobes rounded, very pubescent, ciliate, .1 in. long; lower lip 3-lobed, midlobe ovate crenate, contracted at base, shaggy-villous within, .15 in. long, side lobes rounded, reflexed, .125 in. long. *Stamens* exsert; filaments thickened, pubescent; anthers curved so as nearly to meet at the tips. *Ovary* globose, only slightly glandular; style longer than filaments, pubescent; stigma bifid, the lobes reflexed. *Drupe* ellipsoid, very smooth, .5 in. long, .25 to .35 in. broad, seated on the enlarged cup-shaped calyx; pericarp rather thin. *Seed* apparently 1 only.

KEDAH: lower slopes of Kedah Peak, *Ridley* 5555. PENANG: Government Hill, *Curtis* 323. PERAK: on Waterfall Hill, at 1000 ft., *Wray* 2225; *Scortechini* 2082; in hill forests, at 500 to 800 ft., *King's Collector* 4388, 4638, 7782, 8135. MALACCA: *Griffith* (K.D.) 6065, 1; *Maingay* (K.D.) 1203; at Ayer Panas and Bukit Bruang, *Derry* 98, 1029. SINGAPORE: *T. Anderson* 183.

6. *VITEX SIAMICA*, Williams in Bull. Herb. Boiss. Ser. 2, V. 431 (1905).

A tree with spreading branches, reaching 30 to 40 ft. in height and 15 to 20 in. in diam. of stem; branchlets rather slender, dark brown, glabrous, with prominent usually elongated lenticels. *Leaves* coriaceous-chartaceous; 3-foliate, the leaflets all petiolulate, glabrous, entire; leaflets ovate or ovate-lanceolate, acuminate often bluntly at apex, rounded or cuneate at base, the side leaflets sometimes slightly asymmetric; the middle leaflet 2.5 to 5 in. long, .75 to 1.75 in. broad, the side ones usually about one-third smaller; midrib slender, raised beneath; main nerves 12 to 24 pairs, usually regularly spaced and parallel, only slightly curving to the margin and then anastomosing in an obscure looped marginal nerve, all raised beneath; secondary nerves and reticulations firmly netted; petiole 1 to 2 in. long, slender; petiolules about .5 in. long, the middle one only slightly longer than the others. *Panicles* terminal, with sometimes additional branches from the axils of the upper leaves, minutely puberulous, sessile, many-flowered, reaching sometimes 12 in. in length; rachises very slender, puberulous, obscurely 4-angled; branches at first 3-chotomous, ultimately ending in slender dichasia; bracts many, conspicuous, persistent, linear-lanceolate, .25 to .75 in. long; bracteoles 2 to each pedicel, similar but slightly smaller; pedicels slender, sometimes 0; flowers small, pale blue or white. *Calyx*-tube campanulate, pubescent and with glandular dots without, .05 in. long; teeth 5, acute, .025 in. long; in fruit much enlarged, cup-shaped. *Corolla* small, 2-lipped; tube .1 in. long, pubescent on both sides except at the base, and with many yellow glands; upper lip with 2 short obtuse lobes, lower with 3 obtuse lobes, the middle lobe the longest and villous inside. *Stamens* included or very slightly exsert; filaments thickened, villous; anther-cells ellipsoid, parallel. *Ovary* rounded, depressed, sparsely glandular; style rather thick, as long as stamens; stigma shortly 2-fid. *Drupe* .15 in. in diam., globose, depressed at top, obscurely 4-lobed, glandular, black when dry; pyrene with thin putamen. *Seeds* usually 1 to 2, ovate, acute at base, flattened; testa thin. *V. sympodiophora*, P. Brühl MS. in Herb. Calc. *V. lankavana*, H. H. W. Pearson, MS. in Herb. Penang.

KEDAH: at Coah, Langkawi Island, *Curtis* 1683; at Dayong Bonting, Langkawi, *Fox* 12720. PERAK: on Batu Kurau top, *Scortechini* 1618; in open jungle on the top of limestone hills, at 400 to 1000 ft., *King's Collector* 7034, 8264. SELANGOR: top of rocks, Gua Batu, *Ridley* 8535.

Brühl's description, with drawings, in the Calcutta Herbarium, is most complete, and has been of great use, especially as perfect flowers are very few on the specimens available.

7. *VITEX PUBESCENS*, Vahl Symb. III. 85 (1794). A large tree, reaching a height of 50 to 60 ft. or more; bark ash-coloured, fissured; branchlets quadrangular, brown, lenticellate; innovations tawny-pubescent. *Leaves* chartaceo-coriaceous; digitately 3- to 5-foliolate, the middle leaflet always largest, the two next large, the basal pair when present much smaller; leaflets entire, sessile or subsessile, obovate or elliptic or broadly lanceolate, obtuse or acuminate at apex, rounded or cuneate at base; glabrescent on the upper surface except on the nerves, minutely pubescent on the lower surface; middle leaflet 6 to 8 in. long by about 3 in. broad, rest smaller in gradation; midrib stout; main nerves 12 to 20 pairs, regular, curving gently upwards and connected by prominent nearly parallel transverse nervelets; petiole 2 to 4 in. long, deeply channelled above; petiolules when present under .25 in. long. *Panicles* terminal, densely tawny-pubescent, pyramidal, usually sessile, reaching 10 in. in length and 6 to 8 in. in breadth; rachises sharply quadrangular; branch peduncles often 3 to 4 in. long; bracts many, conspicuous, persistent, ovate or spatulate, those of main nodes sometimes leaf-like; bracteoles similar to the bracts but smaller; pedicels none or very short; flowers blue or lilac. *Calyx* campanulate, thickly tomentose, .15 to .25 in. long; lobes 5 acute. *Corolla* 2-lipped, gibbous; tube broad, pubescent and glandular without except at the base, villous within at the insertion of the stamens, glabrous below it, about .25 in. long; upper lip 2-lobed, lower 3-lobed, the midlobe much the longest, villous within and concave at tip, the others rounded, reflexed. *Stamens* exsert; filaments broad and villous at the base; anther-cells elongate, connected only at tip. *Ovary* glabrous; style slender, longer than stamens; stigma shortly bifid. *Drupe* black, globose, .2 to .3 in. long, depressed at top, faintly ribbed, 4-celled. Schauer in DC. Prodr. XI. 685; Blume Bijdr. 812; Dene. in Nouv. Ann. Mus. d'Hist. Nat. III. 401; Bedd. Fl. Sylv. XXI.; Kurz For. Fl. II. 271; Miq. Fl. Ind. Bat. II. 861; Clarke in Hook. f. Fl. Br. Ind. IV. 585; Koord. & Val. Bijdr. VII. 202; Prain Beng. Plants 833. *V. arborea*, Roxb. Hort. Beng. 46, and Fl. Ind. III. 73; Jack in Mal. Misc. I. 18, and in Hook. Bot. Misc. I. 285; Wall. Cat. 1747; Wight Ic. t. 1465. *V. inaequifolia*, Turcz. in Bull. Soc. Imp. Nat. Mosc. II. 223.

PENANG: Wallich 1747 part; J. Scott; Curtis 64. PERAK: at Thaipeng, Wray 139; King's Collector 267; Scortechini 77, 99, 916. MALACCA: Griffith; Maingay (K.D.) 1204; Derry. SINGAPORE: Wallich 1747 part; Schomburgk 48; Cantley 17; Ridley.—DISTRIB. India, Burma, Malay Archipelago.

8. *VITEX HETEROPHYLLA*, Roxb. Hort Beng. 46 (1814), and Fl. Ind. III. 75 (1832). A large tree, reaching 80 ft. in height and 3 ft. in diam.
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of stem; branchlets quadrangular, dark grey, lenticellate, gland-dotted. *Leaves* chartaceous; 5-foliolate, the middle leaflet longest, the next pair not much smaller, the lowest pair sometimes nearly as long, sometimes reduced, all petiolulate or the lowest sometimes sessile; leaflets entire, variable, elliptic or elliptic-oblong or -ovate or -obovate, often long-cuspidate-acuminate at apex, attenuate or somewhat rounded at base, the side leaflets usually unequally; both surfaces glabrous, dark reddish-brown when dry, the upper with white, the lower with yellow glands; middle leaflet 5 to 7 in. long, 3 to 4 in. broad, the rest smaller in proportion; midrib stout, slightly impressed above, raised beneath; main nerves 7 to 10 pairs curving upwards to and along the margin and joined by fairly regular and prominent transverse nervules; petiole 3 to 6 in. long, terete below and flattened above; petiolule of middle leaflet .5 to 1 in. long, of next pair about .5 in., of the lowest pair 0 to .25 in. long. *Panicles* terminal, the lowest nodes often leafy, thinly cinereous-tomentose, usually sessile, thyrsoïd, reaching 12 in. in length and 8 in. in diam.; branches opposite, elongate, quadrangular, bearing interrupted pairs of cymules usually .5 to .75 in. long; bracts 0 or very small; pedicels very short; flowers pale yellow with a blue lip. *Calyx* tubular campanulate, grey-pubescent and glandular, .1 in. long, enlarged and broadened and ribbed in fruit; teeth 5, small, acute. *Corolla*-tube broadly funnel-shaped, pubescent and dotted with yellow glands without, glabrous within except a row of villous hairs within below the insertion of the stamens; 2-lipped, the upper lip of 2 recurved acute lobes .1 in. long, the lower of 3 lobes, the side ones recurved, obtuse, .1 in. long, the middle one oblong, .15 in. long, villous on the throat. *Stamens* exserted, curved; filaments glabrous; anther-cells oblong, at first curved downwards, afterwards divaricate. *Ovary* rounded, glabrous except a few glandular dots; style slender, thickened above; stigma shortly 2-lobed. *Drupe* pyriform, depressed at top, sparsely glandular, blackish-grey and wrinkled when dry; pyrene very hard, ribbed, hollowed at base. *Seeds* oblong, flattened, .2 in. long, .075 in. broad; testa thin, spongy; cotyledons oblong, .1 in. long; radicle .04 in. long. Wall. Pl. As. Rar. 15, t. 226, and Cat. 1745; Schauer in DC. Prodr. XI. 686 *partly*; Clarke in Hook. f. Fl. Br. Ind. IV. 585; Prain Beng. Plants 833.

PERAK: at Tapa, *Wray* 197; in hill forests up to 1000 ft., *King's Collector* 6034, 7530, 10063, 10377.—DISTRIB. India (Sikkim, Assam and East Bengal).

9. VITEX SUMATRANA, Miq. Fl. Ind. Bat. Suppl. 567 (1860).

VAR. *urceolata*, King & Gamble. A tree, reaching 40 to 60 ft. in height and 2 ft. in diam. of stem; branchlets quadrangular, channelled

at the sides from raised lines descending from the sides of the petiole, glabrous or very slightly puberulous. *Leaves* chartaceous, 3- to 5-foliate, the middle leaflet longest, the next pair not much smaller, the lowest pair a good deal smaller, all petiolulate or the lowest pair subsessile; leaflets entire, obovate or oblong-obovate, shortly suddenly acuminate at apex, rounded often unequally at base; upper surface glabrous, except on the nerves, olivaceous-brown, shining, rough, minutely white-gland-dotted; lower surface glabrous, paler than the upper, with minute yellow glands; middle leaflet 4 to 6 in. long, 2.5 to 3 in. broad, rest gradually smaller but similar; midrib strong, impressed above; main nerves about 10 pairs, irregular, curving upwards to and along the margin and joined by rather irregular transverse nervules; petiole 1.5 to 4 in. long, quadrangular but not winged; petiolule of middle leaflet about 1 in. long, of next pair about .5 in. long, of the lowest pair 0 to .25 in. long. *Panicles* terminal, thinly cinereous-tomentose, thyrsoïd, usually sessile, reaching 8 in. in length and 5 in. in diam.: branches elongate, cylindric, bearing interrupted whorls of pairs of many-flowered cymes about .5 in. long; branch-peduncles 1 to 2 in. long; bracts linear .1 to .15 in. long, recurved, deciduous; buds large, reaching .25 in. long. *Calyx* tubular-campanulate, .15 in. long, flattened in fruit and enlarged; tube tawny-pubescent and glandular without, glabrous within; teeth short, acute, rounded in fruit. *Corolla*-tube curved, contracted at the throat, .25 in. long, pubescent without except at the base, quite glabrous within; 2-lipped, upper lip of 2 erect crenate lobes .1 in. long, lower of 3 lobes, midlobe broad, crenate, obtuse, .2 in. long, side lobes shorter, reflexed, all pubescent without, glabrous within. *Stamens* curved, exsert; filaments glabrous; anther-cells attached only at one point, curving to nearly erect. *Ovary* conical, with a few glands on its top; style thickened, sigmoid below, glabrous; stigma shortly 2-lobed. *Drupe* globose, depressed, .3 to .5 in. long, shortly apiculate, wrinkled when dry; pyrene very hard. *Seeds* flattened, oblong; testa thin, spongy. *V. urceolata*, Clarke in Hook. f. Fl. Br. Ind. IV. 585 (1885). *V. heterophylla*, Schauer in DC. Prodr. XI. 686 partly. *V. Loureirii*, Herb. Wight, not of Hook. & Arn.

PERAK: in Upper Perak, at 300 ft., Wray 3653; Scortechini 61; in dense mixed jungle, at 400 to 600 ft., King's Collector 10406. MALACCA: Griffith (K.D.) 6064; Maingay (K.D.) 1205, 1207.

As pointed out by Clarke, this variety differs in the glabrescent foliage, larger flowers and larger drupes. *V. heterophylla*, Roxb., with which Koorders & Valetton would combine *V. urceolata*, has different leaves and inflorescence and a corolla villous within.

10. *VITEX PTEROPODA*, Miq. Fl. Ind. Bat. Suppl. 567 (1862). A tree, reaching 40 to 60 ft. in height and a considerable diameter of stem; branchlets stout, pale brown, obscurely quadrangular. *Leaves* coriaceous; 5- to 7-foliate, only the lowest pair much smaller than the others; petiole prominently and very broadly winged; leaflets long, lanceolate or oblong-lanceolate or oblanceolate, acuminate at apex, cuneate at base; both surfaces glabrous, minutely dotted and so scabrid to the touch; margins recurved; 4 to 20 in. long, 1 to 2.5 in. broad; midrib stout; main nerves 12 to 16 pairs, prominent on the lower surface, at first somewhat straight and then curving to and along the margin till they meet, joined by prominent transverse nervules and reticulations; petiole 4 to 7 in. long, broadly winged, the wings broadest (1 to 1.5 in. on either side) at a short distance from the base, sometimes narrowed only near the top, sometimes earlier and then curving upwards, often cordate or auricled at both ends; petiolules .5 to 1 in. long, bordered by the decurrent margins of the leaflet blades. *Panicles* terminal or partly axillary to uppermost leaves, subsessile, glabrous, reaching 1 ft. in length and about 8 in. in diam.; rachises slender, angular, striate or channelled; peduncles of all classes, primary secondary and tertiary, long, ending in few sparse few-flowered short cymules scarcely .25 in. long; bracts linear, acuminate, .1 to .15 in. long, persistent; bracteoles under the calyx similar but shorter; pedicels 0 or very short; flowers white with a pink tinge. *Calyx* urceolate, glabrous, .1 in. long; teeth 5, acute. *Corolla*-tube short, .075 to .1 in. long, puberulous without, glabrous or very slightly villous within near the base; lobes short, obtuse. *Stamens* scarcely exsert; filaments villous; anther-cells ellipsoid, nearly parallel. *Ovary* globose, much depressed, glabrous; style slender; stigma shortly 2-forked. *Drupe* ovoid-oblong, .75 to 1 in. long, .5 in. in diam., smooth, seated on the spreading, much enlarged calyx; pericarp very thick; seed 1.

PERAK: *Scortechini*; in dense jungle or low ground near Larút, *King's Collector* 5249, 6668.—DISTRIB. Sumatra (*Teysmann*).

It is unfortunate that we could only find, in all the specimens available, one broken and imperfect corolla. The tree is a remarkable one, and is clearly very nearly allied to *V. per-alata*, King, but differs in the long narrow leaflets with scabrid points, the glabrous, usually terminal, sparsely flowered panicles, short corolla-tube and smaller drupes. The broad wings to the petioles are much the same in both. The specimen of *Teysmann's* at Kew consists only of a couple of leaflets about 20 in. long.

11. *VITEX PER-ALATA*, King MS. in Herb. Calc., Kew Bull. 112 (1908). A spreading tree, reaching 80 ft. in height and 2 ft. in diam. of stem; branchlets very thick, angular, striate, dark brown. *Leaves*

coriaceous; 5- to 7-foliate, only the lowest pair much smaller than the others; petiole prominently and very broadly winged; leaflets elliptic or elliptic-obovate, acute at apex, long-attenuate at base; both surfaces glabrous; margins recurved; middle lobe 6 to 20 in. long, 3 to 6 in. broad, the rest smaller in proportion; midrib stout, impressed above, raised beneath; main nerves 10 to 14 pairs, prominently raised beneath, curving upwards to and along the margin, joined by a conspicuous (on upper surface) network of reticulations; petiole 3 to 6 in. long, the wings broad below and almost cordate, the breadth (the broadest at 1 to 2 in. above the base) reaching 1.5 to 2 in. on either side at widest, curving upwards rather abruptly or gradually to the top, and veined like the leaves; petiolules often 0, when present scarcely reaching .25 in. long. *Panicles* terminal or sometimes axillary to the uppermost leaves, sessile or peduncled, puberulous, reaching 2 ft. in length and about 1 ft. in diam.; rachises angular, channelled; peduncles up to 8 in. long, very stout, somewhat flattened; secondary peduncles of branches in whorls of 4 around the main rachis, up to 5 in. long; flowers in short opposite or alternate many-flowered cymes, about .5 in. long, along the branches; bracts linear-lanceolate, .1 to .2 in. long, persistent; pedicels 0 or very short; flowers light blue with brown markings. *Calyx* pink, shortly urceolate, tawny-pubescent, .1 to .15 in. long; teeth short, acute, in fruit slightly enlarged and recurved. *Corolla*-tube campanulate, .25 in. long, pubescent without, villous within around the point of insertion of the stamens and up to the midlobe of the lower lip; upper lip of 2 ovate acute lobes .1 in. long, the lobes reflexed; lower lip of 3 lobes, side lobes oblong, rounded, .15 in. long, reflexed; midlobe broad, obtuse, .2 in. long, all puberulous. *Stamens* exsert; filaments flattened at base, villous hairy; anther-cells ellipsoid, rather short, slightly divaricate. *Ovary* rounded, depressed, villous at top, glabrous below; style slender, slightly longer than the stamens; stigma shortly 2-forked. *Drupe* ovoid-conoidal, smooth, longitudinally ribbed, 1.5 in. long by 1 to 1.25 in. broad; pericarp very thick; pyrene with rather soft shell. *Seed* 1; testa membranous; cotyledons orbicular, flat.

PERAK: at Simpang, *Wray* 2029, 2254, 2305; in dense jungle on low wet ground near Larút, *King's Collector* 2064, 6187, 6874, 8299.

This must be a splendid tree and worthy of cultivation for ornamental purposes. The large fruit, resembling that of the walnut, and the broad wings to the leaf-petioles are very characteristic.

12. *VITEX GLABRATA*, Br. Prodr. Fl. Nov. Holl. 512 (1810). A large tree; branchlets pale brown, obscurely quadrangular; innovations
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fulvous-tomentose. *Leaves* chartaceous; digitately 3- to 5-foliate, the lowest pair rather smaller than the others, the middle leaflet slightly larger; leaflets entire, petiolulate, obovate elliptic or elliptic-oblan-ceolate, acuminate at apex often obtusely, attenuate or cuneate at base; both surfaces grey-pubescent when young, afterwards glabrate or with scattered appressed hairs and a few glands beneath, the nerves beneath pubescent and with tufts of hair in the axils; 2 to 6 in. long, 1.5 to 2.5 in. broad; midrib slender, impressed above, raised beneath; main nerves 10 to 20 pairs, regular, slender, the uppermost ones obscure, slightly curved to the margin; transverse nervules and reticulations obscure; petiole 3 to 6 in. long, angular, channelled above; end petiolules .75 to 1 in. long, rest .25 to .5 in. long, angled and channelled. *Cymes* axillary, corymbose, peduncled, puberulous, reaching 4 to 5 in. in length and 2 to 3 in. in diam.; peduncles slender, angular, up to 2 in. long; branches markedly dichotomous, spreading; bracts linear, pubescent, caducous; pedicels slender, 0 to .1 in. long; flowers white, the lip blue-purple. *Calyx* campanulate, .05 to .1 in. long, pubescent without, enlarged in fruit; teeth 5, very short, acute. *Corolla*-tube broadly cylindric, .2 in. long, pubescent without, glabrous within except a ring of villous hairs at the insertion of the stamens, the hairs extending up the midlobe of the lower lip; upper lip with 2 obtuse recurved lobes .15 in. long; lower lip 3-lobed, the side lobes recurved, .15 in. long, the midlobe spreading, .25 in. long, densely villous. *Stamens* much exsert; filaments villous; anther-cells short, ellipsoid, divaricate. *Ovary* globose, pubescent at top; style slender, as long as stamens; stigma spreading. *Drupe* ovoid or obovoid, succulent, .3 to .5 in. in diam., smooth. Schauer in DC. Prodr. XI. 695; Benth. Fl. Austral. V. 68; Clarke in Hook. f. Fl. Br. Ind. IV. 588; Koord. & Val. Bijdr. VII. 208; Prain Beng. Plants 833. *V. Cunninghami*, Schauer l.c. 691. *V. leucoxyton*, Schauer l.c. 692 in part; Kurz For. Fl. II. 273; Miq. Fl. Ind. Bat. II. 864, not of Linn. f. *V. bombacifolia*, Wall. Cat. 1749; Walp. Rep. IV. 86. *V. pallida*, Wall. Cat. 1751.

KEDAH: in dense jungle near sea-level, *Kunstler* 1763. PENANG: *Curtis* 1071.—DISTRIB. India (Assam to Chittagong), Burma, Java, Siam, Cochin China, North Australia and Queensland.

13. *VITEX LONGISEPALA*, King & Gamble in Kew Bull. 112 (1908). A small or moderate-sized tree; branchlets rather stout, obscurely quadrangular, softly tawny-pubescent as are the innovations. *Leaves* membranous; trifoliate, the middle leaflet largest and petiolulate, the side ones subsessile; leaflets ovate or elliptic-ovate, abruptly caudate-acuminate at apex, the middle leaflet acuminate or cuneate at base, the

side ones cordate or rounded or acute and unequal; the upper surface sparsely hispid and gland-dotted, the lower tawny-pubescent, villous on the nerves and gland-dotted; margins entire; 4 to 12 in. long, 2 to 6 in. broad; midrib stout; main nerves 8 to 15 pairs, curving outwards to and along the margin and joined by many transverse nervules and reticulations; petiole 2 to 6 in. long, densely tawny-pubescent; petiolule of middle leaflet .25 to 2 in. long, of side leaflets none or under .5 in. long. *Cymes* axillary, opposite, tawny-pubescent, 1 to 2.5 in. long; main peduncles usually 2, vertically arranged, 1 to 1.5 in. long; branches 2- to 3-chotomous, spreading, corymbose; bracts conspicuous, narrowly lanceolate, .25 to .75 in. long, persistent; pedicels about 1 in. long; flowers primrose-yellow. *Calyx* villous, with golden brown hairs; tube campanulate, .1 in. long; lobes 5 subequal, oblong-lanceolate, .25 in. long, conspicuous. *Corolla*-tube slender, funnel-shaped, .4 to .5 in. long, prominently dotted with yellow glands; 2-lipped with a scanty ring of hairs within at the insertion of the stamens, .15 in. above the base of; upper lip shortly 2-lobed, the lobes rounded; lower lip 3-lobed, side lobes reflexed, middle lobe narrowed below, broadened above and fimbriate, twice as long as side lobes. *Stamens* exsert: filaments glabrous, slender; anther-cells elongate, narrow, parallel. *Ovary* conoidal on a cylindric base, the top densely yellow-glandular; style slender; stigma bifid. *Drupe* ovoid, black, smooth, gland-dotted, .3 in. long; pyrene hard, reticulately ridged, with 3 to 4 fertile cells near the top and a large cavity below. *Seeds* obovoid, slightly flattened, .075 in. long; testa thin.

PENANG: at Batu Kawan, *Curtis* 395. PERAK: at Bujong Malacca, *Ridley* 9723; at Tapa, *Wray* 1319; at Waterloo, *Curtis*; *Scortechini* 100, 113, 340; in open jungle, Goping, *King's Collector* 460. SELANGOR: *Ridley* 7595; at Rawang, *Goodenough* 10488.

This species is very near indeed to *V. vestita*, but differs in the much larger leaves and the prominent large bracts and calyx-lobes.

14. *VITEX VESTITA*, Wall. Cat. 1750 (1828). A moderate-sized tree; branchlets rather slender, obscurely quadrangular, softly grey-tawny-pubescent as are innovations. *Leaves* membranous; trifoliolate, all three leaflets petioluled, the mid-leaflet much the largest; leaflets elliptic or elliptic-lanceolate, long-acuminate at apex, the middle leaflet equally acuminate at base, the side ones rounded or acute with more or less unequal sides; the upper surface sparsely hispid and gland-dotted, the lower softly tawny-pubescent, villous on the nerves, also yellow-gland-dotted; margins entire; 3 to 7 in. long, 1.5 to 4 in. broad; midrib stout; main nerves 8 to 10 pairs, curving upwards to

and along the margin and joined by prominent rather irregular nervules and reticulations; petiole usually slender, 2 to 3 in. long, petiolule of middle leaflet 1 to 1.5 in. long, of side leaflets .25 to .5 in. long. *Cymes* axillary, opposite, sessile, tawny-pubescent, 1 to 1.5 in. long, 2- to 3-chotomous; main peduncles usually 2, sometimes more, one above the other vertically, .25 to .5 in. long; branches 2- to 3-chotomous, corymbose, spreading; bracts minute, linear, caducous; pedicels slender, 0 to .1 in. long; flowers yellow (*Kunstler*). *Calyx* campanulate, densely pubescent and gland-dotted without, .1 to .15 in. long, subtruncate or 2-lipped, enlarged and saucer-shaped in fruit; lobes acute, short. *Corolla*-tube slender, 2-lipped, narrow, cylindric, .4 to .5 in. long, glabrate without and with large yellow glands, glabrous within except for a villous ring about .1 in. above the base and as far below the insertion of the stamens; upper lip shortly 2-lobed, lower 3-lobed, the midlobe slender, hardly longer than the others. *Stamens* included; filaments glabrous; anther-cells elongate, narrow, curved downwards, each ending in an oblong empty appendage about half as long as the cell. *Ovary* densely covered with yellow glands, oblong, obtuse; style slender. *Drupe* oblong, .3 to .4 in. long and .25 in. broad, sparsely gland-dotted; pyrene hard, reticulately ridged, with 3 to 4 fertile cells near the top and a large empty cavity below. *Seeds* obovoid, flattened, acute at base, .06 in. long; testa thin; cotyledons elliptic, fleshy; radicle small. Schauer in DC. Prodr. XI. 692; Miq. Fl. Ind. Bat. II. 864; Kurz For. Fl. II. 272; Clarke in Hook. f. Fl. Br. Ind. IV. 587. *V. Finlaysoniana*, Wall. Cat. 6314.

PENANG: *Wallich* 1750 B, *G. King*; at Penara Bukit, *Curtis* 265. PERAK: on Maxwell's Hill, *Wray* 699; *Kunstler* 176. SELANGOR: at Bukit Kutu, *Goodenough* 10547. MALACCA: *Griffith* (K.D.) 6063; *Cuming* 2351; *Derry* 656, 899. JOHORE: at Jaffaria, *G. King*. SINGAPORE: at Sungei Jeeroo, *Ridley* 3867; at Chenchukang, *Goodenough* 2792.—DISTRIB. Burma, *Wallich* 1750 A; Sumatra, Borneo.

15. *VITEX GAMOSEPALA*, Griff. Notul. IV. 178, and Ic. Pl. Asiat. t. 448, fig. 2 (1854). A slender moderate-sized tree; branchlets dark brown, prominently lenticellate, innovations fulvous-hairy. *Leaves* chartaceous; trifoliate, all three leaflets petiolulate, the mid-leaflet somewhat the largest; leaflets entire, ovate or lanceolate, long-acuminate at apex, the side leaflets acute and slightly unequal at base, the mid-leaflet acuminate; both surfaces glabrate except on the nerves beneath, the lower glandular, brown when dry, the upper olivaceous; 3 to 7 in. long, 1.5 to 2.5 in. broad; midrib stout, raised beneath; main nerves 5 to 7 pairs, curving acutely upwards to and along the margin where they meet, joined by an irregular network of nervules, prominently

raised beneath when dry; petiole slender, terete, 2 to 4 in. long; petiolule of mid-leaflet .75 to 1 in. long, of side leaflets .25 in. long. *Cymes* axillary, sessile, corymbose, sparingly fulvous-hairy, 2-chotomous below, 3-chotomous above, reaching 1.5 in. long or more; bracts short, linear, caducous; pedicels slender, 0 to .1 in. long; flowers pale yellow. *Calyx* 2-lipped; tube ovoid, .1 in. long, densely glandular without as are the lobes; upper lip entire, oblong, .275 in. long; lower lip 2-lobed, .075 in. long, the lobes rounded; in fruit split on one side to the base and enlarged to a beaked shallow cup. *Corolla* funnel-shaped; tube .35 in. long, with a ring of hairs within near the base; upper lip entire or shortly 2-lobed, lower 3-lobed, the middle lobe .125 in. long, 2-fid, the side lobes .06 to .1 in. long; tube and lobes, except the ends of the middle lobe of the lower lip which are usually incurved, all covered with prominent large shining yellow glands. *Stamens* exsert; anthers sparsely pilose near the base; cells elongate, parallel, each with a short empty beak. *Ovary* conical, densely glandular; style slender, glabrous; stigma shortly 2-lobed. *Drupe* obovoid, black, slightly glandular, fleshy, .3 in. long, .25 in. in diam.; pyrene very hard, reticulately ridged, hollow at the base, the 3 to 4 cells near the top bearing seeds. *Seeds* oblong, beaked below, .05 in. long; testa thin; cotyledons fleshy, convex, elliptic; radicle minute. Benth. in Gen. Pl. II. 1154; Clarke in Hook. f. Fl. Br. Ind. IV. 588.

PERAK: at Larút, *Scortechini* 445, 1480; in dense forest near Larút, at 500 to 1000 ft. alt., *Kunstler* (*King's Collector*) 1841. SELANGOR: at Kwala Lumpur and on Pahang road, *Ridley* 8546, 10218, 10479; *Curtis* 2366. MALACCA: at Chin Rhingull, *Griffith* (K.D.) 6065; *Maingay* (K.D.) 1202. SINGAPORE: at Changi, *Ridley* 2788.

As pointed out by Clarke, this species in its inflorescence and corolla, and, it may be added, in its fruit, shows a great affinity to *V. vestita*. But the calyx distinguishes it at once, and the leaves differ a good deal. Griffith's fig. represents the anthers only.

VAR. *Scortechinii*, King & Gamble. *Cymes* shorter and few-flowered. *Calyx* much shorter, the upper lip only .075 in. long, the lower .025 in. with more acute lobes. *Corolla* similar, but middle lobe of lower lip entire and yellow glands much fewer and less prominent.

PERAK: *Scortechini*; at Bujong Malacca, *Ridley* 9725; at Tapa Batang Padang, *Wray* 180; at lower camp, Gunong Batu Pateh, 3400 ft., *Wray* 992, 1080. NEGRI SEMBILAN: at Seremban, *Ridley* 10096.—DISTRIB. Sumatra (*Forbes* 3060).

VAR. *Kunstleri*, King & Gamble. *Leaflets* ovate, acuminate at apex and base, 2 to 3 in. long, 1 to 1.5 in. broad; petiole 1 to 2 in. long; petiolule of end leaflet .5 in., of side leaflets .25 in. long. *Calyx* 2-lipped;

short, .1 in. long; upper lip .075 in. long, acute or rounded, often 2-lobed; lower lip acutely 2-lobed, the lobes .05 in. long. *Corolla*-tube slender, .45 in. long, very glandular; upper lip shortly 2-lobed; lower lip 3-lobed, side lobes short, narrow, midlobe longer, obtuse. *Anther*-cells with a short rounded beak. Otherwise as in type.

PERAK: at Ulu Bubong, in open jungle at 400 to 600 ft., *King's Collector* 10605. TRINGGANU: at Bunda, *Rostado* (Herb. *Ridley* 11982). —DISTRIB. Sumatra (*Forbes* 2685).

This is a well-marked variety, but is not quite deserving of specific rank.

Tribe III. CARYOPTERIDÆ.

11. PERONEMA, Jack.

A small tree; branchlets grey-tomentose. *Leaves* opposite, imparipinnate; leaflets sub-opposite, in several pairs, entire. *Inflorescence* of large compound, spreading, terminal, trichotomous panicles of corymbose cymes; flowers very small; bracts small, setaceous. *Calyx* campanulate, 5-partite, not accrescent. *Corolla*-tube short; limb 2-lipped, 5-lobed, the midlobe of the lower lip longer than the rest. *Stamens* 2, involute in bud, exsert; anthers broadly ovate-reniform with parallel cells. *Ovary* 4-celled, the cells 1-ovuled; style filiform; stigma entire or bifid; ovules attached laterally near the top of the placenta. *Fruit* a small globose capsule of 4 crustaceous valves, the valves separating from the base together with the adjoining portions of the central placenta. *Seeds* attached centrally near their top, pendulous, exalbuminous; testa thin, as are the cotyledons; radicle minute.—DISTRIB. One species, Malayan.

PERONEMA CANESCENS, Jack in Mal. Misc. II. No. 7, 46 (1822). A small tree; bark grey; branchlets stout, grey, obtusely quadrangular; pith quadrangular. *Leaves* chartaceous, reaching 1 to 2 ft. in length; pinnules 7 to 9 pairs, the upper pairs usually opposite, the lower sub-opposite or nearly alternate; the rachis winged, the wings narrow, from .05 to .25 in. broad; petiole 2 to 7 in. long; leaflets sessile, lanceolate, acuminate at apex, cuneate at base, gradually increasing in size upwards, from 1 in. by .5 in. at the base to as much as 9 in. by 2.5 in. at the tip; upper surface glabrous, lower puberulous, tawny-canescens; margins entire or serrate; midrib prominent; main nerves 20 to 30 pairs, regular, straight, joined by loops near the margin; reticulations netted. *Panicle* reaching 12 in. in length and about 20 in. in breadth, tawny-puberulous; peduncle stout; rachis quadrangular; lower branches opposite, long- (4 to 5 in.) peduncled, ending, as the upper ones, in corymbose, many-flowered cymes; bracts scarcely .2 in. long.

bracteoles very small, numerous; pedicels slender, very short; buds globose; flowers white. *Calyx* .1 in. long; lobes acute, glabrous within. *Corolla* glabrous within, pubescent without; lower midlobe .15 in. long, the rest .1 in. *Stamens* deflexed; filaments thickened towards the base. *Ovary* villous, as is the base of the style. *Capsule* densely tawny-pubescent, .125 in. broad, .1 in. long. Hook. Comp. Bot. Mag. I. 152; Wall. Cat. 9075; Schauer in DC. Prodr. XI. 627; Wight Ic. t. 1460; Griff. Notul. IV. 177; Miq. Fl. Ind. Bat. II. 909; Clarke in Hook. f. Fl. Br. Ind. IV. 599; Koord. & Val. Bijdr. VII. 214. *P. heterophyllum*, Miq. Fl. Ind. Bat. Suppl. 570.

PENANG: Racecourse, Curtis 2427. PERAK: at Ijuk, *Scortechinii* 1160. MALACCA: Griffith (K.D.) 6015. PAHANG: Ridley 2247. SINGAPORE: at Bukit Mandai, Ridley 3993.—DISTRIB. Sumatra (*Teysmann*, *Forbes* 2655), Java, Borneo (*Motley* 870).

12. PETRÆOVITEX, Oliver.

Shrubs, usually climbing. *Leaves* opposite, simple or 3-foliolate or bipinnate, petiolate. *Inflorescence* of terminal or axillary panicle cymes with puberulous spreading branches; bracts subulate; flowers very small, shortly pedicellate. *Calyx* short, campanulate, much accrescent after flowering, the tube then long, and the lobes converted into oblanceolate scarious reticulate wings. *Corolla* oblique, 2-lipped; the lobes obtuse, incurved at the tip. *Stamens* 4, subequal or didynamous; exsert or included; anthers oblong; cells parallel. *Ovary* obovoid, imperfectly 2-celled, cells 2-ovuled; ovules pendulous; style slender; stigma bifid. *Fruit* capsular, oblong or wedge-shaped; exocarp thin. *Seeds* 2 (or 1 by suppression), attached to the central placenta; testa membranous; albumen none; cotyledons oblong or obovate, emarginate, fleshy; radicle thick, inferior.—DISTRIB. About 3 species, native of the Malay Peninsula and Archipelago.

Tawny-pubescent; leaves 3-foliolate, leaflets under 3 in. long;

capsule prominently ribbed 1. *P. Scortechinii*.

Glabrous or very slightly puberulous; leaves 1 to 3-foliolate,

leaflets over 3 in. long; capsule not ribbed 2. *P. bambusetorum*.

1. PETRÆOVITEX SCORTECHINII, King & Gamble in Kew Bull. 113 (1908). A shrub, perhaps scrambling; branchlets pale brown, somewhat angular, puberulous; innovations tawny-pubescent. *Leaves* opposite, membranous, trifoliolate; end leaflet ovate, shortly and obtusely acute at apex, rounded or slightly cuneate at base; 2 to 3 in. long, 1 to 2 in. broad; upper surface minutely pubescent, lower grey-pubescent; margins entire or undulate, main nerves 4 pairs, curving sharply upwards; side

leaflets similar but rather smaller and usually somewhat unequally cordate at base; petiole 1.5 to 2 in. long; petiolule of end leaflet .5 to .75 in. long, of side leaflets .25 in. long, all pubescent. *Cymes* in axillary, tawny-pubescent, 3- or 2-branching panicles up to 6 in. long, the uppermost very short and few-flowered; bracts leafy, nearly orbicular, .5 to .75 in. in diam., pale; pedicels short. *Calyx* deeply-cleft, tawny-pubescent; lobes 5 or 4, oblong or spathulate, .25 in. long; fruiting calyx much enlarged; the tube .25 in. long, enclosing the fruit; the 5 or 4 lobes expanded into elliptic oblong shining scarious lobes .75 to 1 in. long, having 3 to 5 longitudinal nerves and prominent netted reticulation. *Corolla* very small (buds only available), 2-lipped; lobes spathulate, concave, .1 to .15 in. long. *Stamens* 4 exsert, 2 lower longer than the 2 upper; filaments short; anther-cells of upper pair parallel, of lower slightly divaricate. *Ovary* cylindric, villous, obtuse at top, 2-celled; style short; stigma 2-lobed, the lobes spreading. *Fruit* capsular, oblong or wedge-shaped, obtuse and pubescent at tip, .2 to .25 in. long; exocarp chartaceous, striate. *Seeds* 2 (or 1 by suppression); cotyledons obovate, obliquely obtuse, emarginate, .15 in. long, .1 in. broad.

PERAK: *Scortechini* 753 (or 1753?).

2. *PETREOVITEX BAMBUSETORUM*, King & Gamble in Kew Bull. 113 (1908). A creeper reaching 30 to 50 ft. long and 2 to 3 in. in diam. (*King's Collector*); branches smooth, pale brown. *Leaves* opposite, chartaceous, 1- or 3-foliolate; leaflets ovate, acuminate at apex, rounded or slightly cuneate at base; 3 to 4 in. long, 1.5 to 2.5 in. broad; both surfaces glabrous; margins entire; main nerves about 8 pairs, straight to join a looped intramarginal nerve rather far from the edge; reticulations netted, raised, prominent beneath; petiole 1 to 2 in. long; petiolules .25 to .5 in. long, slender, the end one slightly the longest. *Cymes* in sessile or peduncled, thyrsoïd, axillary, glabrous or puberulous panicles reaching 4 to 5 in. long and about 3 in. broad; rachis angular, very slender as are the branches and pedicels; bracts leafy, lanceolate, long-acuminate; bracteoles minute, setaceous; pedicels very short; buds ovoid. *Calyx* in bud very small, scarcely .05 in. long, with triangular acute teeth; gradually enlarging later until in fruit it has a tube .25 to .35 in. long and strongly ribbed, with oblong-spathulate, membranous, shining lobes .4 to .5 in. long and .1 to .15 in. broad; the lobes prominently 3-nerved and reticulate. *Corolla* very small (buds only available), 2-lipped, the upper lip slightly 2-lobed, the lower deeply 3-lobed, all very small and glabrous. *Stamens* 4, subequal; filaments stout; anthers oblong with parallel cells. *Ovary* rounded; style short; stigma 2-lobed. *Fruit* capsular, wedge-shaped, slightly convex above, .3 in. long; exocarp thin pubescent, not ribbed. *Seeds* 2 (or 1

by suppression); testa membranous; cotyledons obovate, truncate and slightly emarginate.

PERAK: in dense bamboo forests, at 500 to 700 ft., near Ula Kerling, *King's Collector* 8765.—DISTRIB. Borneo (*Haviland* 1913; *Ridley* 9065).

The Perak specimens are rather poor ones, with flowers in bud and very young fruit, and they have 3-foliate leaves, while the Borneo specimen is unifoliate and in fruit; so that it is not quite certain that they belong to the same species, but after very careful examination we believe that they do, as the leaflets are identical and so are the nerves of the fruiting calyx.

The genus *Petræovitz* was founded by Prof. D. Oliver on *P. Riedelii*, Oliv., in Hook. f. Ic. Pl. V. 15. t. 1420 (1883), a plant sent from the Island of Buru by Mr. Riedel, and remarkable for its bipinnate leaves.

Tribe IV. SYMPHOREMEÆ.

13. SPHENODESME, Jack.

Climbing shrubs. *Leaves* opposite, entire. *Inflorescence* of capitate, 3- or 7-flowered, centrifugal cymes enclosed in an involucre of 6 foliaceous accrescent bracts, the cymes in pairs on the branches of large terminal or axillary, leafy, thyrsoid panicles. *Calyx* ovoid-campanulate, usually enlarging after flowering; lobes of 5 rather short teeth. *Corolla* sub-regular; tube short, cylindric; lobes 5, rarely 6, subequal, imbricate in bud. *Stamens* 5, inserted in the tube of the corolla below the throat, included or exsert; anthers small, oblong or reniform, the cells parallel or divergent. *Ovary* 2-celled, the cells 2-ovuled; ovules pendulous from the apex of the placentiferous axis; style filiform, short or long; stigma 2-lobed. *Drupe* globose or obovoid, included in the calyx, 1-seeded or rarely 2-seeded; exocarp leathery. *Seed* globose, entirely filling the cavity or its lower part; the placentas included within the cotyledons; testa membranous; cotyledons thick, very fleshy; radicle very small, inferior.—DISTRIB. About 10 species, in India, Malaya and the Malay Archipelago.

Corolla-lobes long, narrow; style very short; anthers included in the corolla-tube (Sect. 1. *BRACHYNEMA*, Griff.) 1. *S. ferruginea*.
Corolla-lobes ovate or oblong, broad; style long, exsert; anthers exsert (Sect. 2. *EUSPHENODESMA*, C. B. Clarke):—

Flower-heads 3-flowered, the 6 bracts small in flower, enlarged in fruit; branchlets and leaves glabrous or nearly so 2. *S. triflora*.
Flower-heads 7-flowered, the 6 bracts enlarged both at flowering-time and in fruit:—

Branchlets, leaves and inflorescence rufous-hirsute; calyx very hirsute 3. *S. barbata*.
Branchlets, leaves and inflorescence sparingly pubescent or glabrate; calyx nearly glabrous 4. *S. pentandra*.

1. SPHENODESME FERRUGINEA, Briquet in Engl. & Prantl Pflanzenfam. IV. 3A, 181 (1894). A shrub, probably climbing; branchlets and inflorescence rusty stellate-tomentose; branchlets obscurely quadrangular. *Leaves* chartaceous; ovate or elliptic, acute at apex, cuneate or obtuse at base; sparsely hispid-pubescent on the upper surface, especially on the nerves, softly ferruginous-tomentose on the lower; 3 to 5.5 in. long, 2 to 3.5 in. broad; midrib stout; main nerves 5 to 6 pairs, the lowest pair from close to the base, the next about .2 in. above it, both nearly straight to the margin and then along it, the rest curved to meet in a looped intramarginal nerve; transverse nervules irregular; petiole stout, .25 in. to .5 in. long. *Panicles* axillary or terminal, spreading, leafy, densely covered with tawny-yellow tomentum, the whole forming a thyrus 12 in. or more in length and about as broad; peduncles 2 to 3 in. long, 3- or 5-chotomous, the two lower branchlets short-peduncled with each a pair of capitate heads, the two upper long-peduncled and again branching; heads 7-flowered supported by 6 spatulate bracts .75 in. long and .25 in. broad; buds obovoid; flowers sessile. *Calyx* tubular, densely stellate-tomentose without, whitish-villous within, .25 in. long, 2-lipped, the lips variably lobed, usually the upper 2-lobed rather deeply cleft, the lower very minutely 3-toothed. *Corolla*-tube funnel-shaped, slightly curved, .3 in. long, tomentose without, densely villous within; lobes 5, 6 or 7, .2 in. long, linear or ligulate, twisted. *Stamens* included, inserted low down on the corolla-tube, usually somewhat irregularly but generally in 2 to 3 rows, if 3 rows and 7 stamens the upper row 3, the middle 2, the lower 2, these latter close to the base; filaments slender, glabrous, about .1 in. long; anthers reniform. *Ovary* columnar, glabrous; style extremely short; stigma very shortly bifid. *Fruit* not known. *S. microstylis*, Clarke in Hook. f. Fl. Br. Ind. IV. 600. *Brachynema ferruginea*, Griff. Notul. IV. 176.

SIAMESE STATES: Pungah, abundant! *Curtis* 2963; Tongka, fide *Curtis*.—DISTRIB. Burma (Moulmein & Mergui, *Griffith* (K.D.) 6007, in part; Tavoy, *Parish*), Siam (*Murton* 62).

The curious arrangement of the stamens inside the corolla-tube and the very short style are such well-marked characters that it would almost seem advisable to reconstitute the genus *Brachynema*, or else to bring together into one genus of 4 sections *Sphenodesme* with *Symphorema* and *Congea*. We are inclined to consider the latter the best course, but it should be done in discussing a Monograph of the Tribe rather than the few species found in a limited area.

2. SPHENODESME TRIFLORA, Wight Ic. t. 1478 (1850). A climbing (sometimes erect, *Kunstler*) shrub; branchlets dark brown, terete, rough with many small lenticels, a slight ring at the nodes. *Leaves*

chartaceous; lanceolate, bluntly acuminate at apex, cuneate at base; glabrous on both surfaces or the younger ones slightly velutinous; 3 to 5 in. long, 1 to 2 in. broad; midrib prominent beneath; main nerves 5 to 6 pairs, the lowest pair very inconspicuous, close to the margin, the next at about .25 in. from the base and 40° with the midrib, curving up to and along the margin, but not meeting the remaining 3 to 4 which curve at about 50° and meet in intramarginal loops; transverse nervules arched; reticulations netted; petiole .25 to .5 in. long, curved. *Panicles* very long, grey-pubescent, the lower branches leafy with ordinary leaves, the upper ones with gradually smaller leaves becoming bract-like; the branches very long, up to 2 ft., slender, scarcely 1 in. broad, bearing distant opposite pairs of 3-flowered capitate cymules each supported by a pair of reduced leaves and furnished with 6 spatulate bracts usually longer than the flowers and enlarging in fruit; flowers sessile, the corollas dark purple, the calyx and bracts dull red. *Calyx* tubular, 10-nerved, velutinous-pubescent without, densely villous within, .1 to .15 in. long; lobes 5, triangular, short. *Corolla* puberulous; tube cylindric, with a ring of hairs near the mouth within, .25 in. long; lobes 5, subequal, rounded. *Stamens* shortly exsert; filaments slender; anthers reniform, the cells somewhat divergent. *Ovary* pyriform, glabrous; style slender. *Drupe* ovoid or obovoid, sometimes constricted above, included in the enlarged prominently ribbed calyx, and supported by the 6 oblong-spatulate glabrescent enlarged bracts, which reach .5 to .75 in. long and .15 to .3 in. broad, and have 3 prominent nerves joined by transverse nervules; exocarp leathery. *Seed* 1, globose, completely filling the lower part of the cavity of the drupe, the upper part empty; cotyledons .1 in. in diam., including between them the remains of the placenta. Griff. Notul. IV. 182; Miq. Fl. Ind. Bat. II. 910; Clarke in Hook. f. Fl. Br. Ind. IV. 61. *Congea Jackiana*, Wall. Cat. 1735, partly.

PENANG: at Ayer Etam, 1000 ft., *Curtis* 210. PERAK: at Tapa and Jenah, *Wray* 683, 1383, 1752; at Gunting Bidai, *Ridley* 7598; at Salam, *Scortechini* 1119; in open jungle up to 500 ft., *Kunstler* (*King's Collector*) 160, 1098, 1623, 2474. SELANGOR: Semangko Pass, *Ridley* 12086, 12088. MALACCA: *Griffith* (K.D.) 6009, 1; *Maingay* (K.D.) 1196; at Sungei Udang, *Derry* 585. JOHORE: at Bukit Kayara, *Ridley* 11347. SINGAPORE: Kampar jungles, *Deschamps*.—DISTRIB. Sumatra (*Forbes*, 3083).

3. SPHENODESME BARBATA, Schauer in DC. Prodr. XI. 623 (1847). A climbing shrub; branches dark brown, rough, lenticellate; innovations, branchlets and inflorescence patently rufous-hirsute. *Leaves* chartaceous; elliptic or elliptic-oblong or elliptic-lanceolate, suddenly and

obtusely acuminate at apex, also mucronate, acute or somewhat rounded at base; sparsely tawny-villous on both surfaces when young, glabrescent when old except on the nerves; 2 to 4 in. long, 1 to 1.5 in. broad; midrib conspicuous, ending in the mucro; main nerves 5 to 6 pairs, the lowest pair almost from the base, the next a little higher up, the rest more distant, curving to join in an intramarginal nerve; transverse nervules few but prominent; petiole .2 to .3 in. long, twisted. *Panicles* in terminal racemes of heads or in single or few pedunculate axillary pairs of heads; the heads 7-flowered, each with 6 spatulate bracts reaching .75 in. long and .25 in. broad and prominently nerved; peduncles .5 to 1.5 in. long, very slender; flowers sessile, corolla blue. *Calyx* campanulate, .15 to .2 in. long, densely long-rufous-hirsute without; lobes 5, short, triangular, each with often 1 or 2 subsidiary shaggy teeth. *Corolla*-tube cylindric, .1 in. long, glabrous below, villous in a ring at the throat within; lobes subequal, .125 in. long, oblong-spatulate, pubescent without. *Stamens* inserted in the throat of the corolla-tube, exsert; filaments slender, glabrous; anthers oblong, cells parallel. *Ovary* rounded, densely villous; style slender, as long as stamens; stigmatic lobes 2, very short. *Drupe* small, globose or ob-ovoid, included in the enlarged calyx, ferruginous-villous; exocarp crustaceous. *Seed* 1, globose, completely filling the cavity of the drupe; testa very thin; cotyledons thick, .05 to .1 in. in diam. Wight Ic. 1474 (*ferruginea*, R.W. in fig. 7); Miq. Fl. Ind. Bat. II. 910; Clarke in Hook. f. Fl. Br. Ind. IV. 601. *Congea barbata*, Wall. Cat. 1738.

PENANG: Wallich 1738; at Tulloh Bahang, Curtis; Phillips. MALACCA: Griffith (K.D.) 6009,2; Maingay (K.D.) 1194; Hervey.

4. SPHENODESME PENTANDRA, Jack in Mal. Misc. I. 19 (1820), and in Hook. Bot. Misc. I. 285 (1830). A climbing shrub; branchlets obscurely quadrangular, lenticellate, pubescent, dark brown. *Leaves* subcoriaceous; elliptic-oblong, -ovate, or -lanceolate, bluntly acute or acuminate often mucronate at apex, rounded at base; both surfaces glabrous when old, the upper shining, the lower pubescent when young; the nerves beneath generally pubescent; 2 to 7 in. long, 1 to 2.5 in. broad; midrib stout; main nerves 7 to 8 pairs, the lowest very thin and close to the margin, the next a little above, curving to and along the margin almost to the tip, the rest more distant, curving to meet in a prominent looped intramarginal nerve; transverse nervules many, nearly at right angles to the midrib; reticulations netted, prominent; petiole .25 to .5 in. long, pubescent, channelled, curved. *Panicles* axillary and terminal, many-flowered, somewhat puberulous, often racemose, leafy and reaching 6 to 15 in. in length; the capitate heads in opposite pairs on slender .5 to .75 in.

long peduncles; flowers in each head 7, supported by 6 oblong-spathulate, obtuse, nearly glabrous, bracts .75 to 1.25 in. long, .25 to .35 in. broad, and with about 6 prominent nerves and reticulations; flowers blue or purple with a yellowish calyx and pale yellow bracts. *Calyx* campanulate or funnel-shaped, usually prominently 10-ribbed, nearly glabrous, .25 in. long; when young with 5 short lobes and a mucro in the angles between them, when old with 5 prominent acuminate aristate lobes, and 5 aristate teeth in the axils; reticulately nerved in the upper half. *Corolla* tubular, the tube .2 in. long, densely villous within in the upper half, glabrous in the lower; lobes leathery, rounded, .05 to .1 in. long, obscurely in 2 lips, the midlobe of the lower lip recurved, the rest spreading. *Stamens* 5, inserted a little below the mouth of the corolla-tube, long-exserted; filaments slender; anthers oblong, the cells parallel. *Ovary* densely tawny-villous; style very long, slender; stigmatic lobes 2, spreading. *Drupe* the size of a pea, globular (*Roxb.*). *Seed* 1, conform to the drupe; cotyledons unequal. Wight Ic. t. 1475 (*S. Wallichiana*, Schauer in letterpress); Griff. Notul. IV. 181; Clarke in Hook. f. Fl. Br. Ind. IV. 602; Briquet in Engl. & Prantl Nat. Pflanzenfam. IV. 3A, 181, fig. 67 E, F. *S. Wallichiana*, Schauer in DC. Prodr. XI. 622. *S. Jackiana*, Schauer l.c.; Miq. Fl. Ind. Bat. II. 299. *S. acuminata*, Wight Ic. t. 1476 (*S. Jackiana*, Schauer in letterpress). *Roscoea pentandra*, Roxb. Fl. Ind. III. 54. *Congea pentandra* and *Jackiana*, Wall. Cat. 1734, 1735. *C. azurea*, Wall. Cat. 1733, partly. *Symphorema Jackianum*, Kurz For. Fl. II. 255.

JUNKSEYLOON or TONGKA: *Curtis*. KEDAH: Coah on Langkawi Island, *Curtis* 2522; *Ridley* 8320. PENANG: *Wallich* 1735, 1; *Curtis* 269. PROVINCE WELLESLEY: at Krian, *Ridley* 9391. PERAK: *Scortechini* 519; *King's Collector (Kunstler)* 3100, 4532, 7691, 10642. MALACCA: *Griffith*; *Maingay* (K.D.) 1195; *Cuming* 2388; *Derry* 40. PAHANG: *Ridley* 2160. JOHORE: at Bukit Songa, *Ridley* 11122.—DISTRIB. India (Assam, Khasia Hills, Burma), Borneo.

14. CONGEA, Roxb.

Large climbing shrubs, usually tomentose with mixed simple and stellate hairs. *Leaves* opposite, entire. *Inflorescence* of pedunculate, capitate, 3- to 9-flowered, involucre cymes in large terminal panicles; the bracts at the base of the peduncles leaf-like, often white or coloured; the involucres of 3 or 4 elliptic or oblong or spathulate bracts connate at the base. *Calyx* tubular, funnel-shaped, slightly accrescent, 5-toothed. *Corolla*-tube slender, widening upwards, glabrate without,

usually villous within, 2-lipped; the upper lip of 2 lobes, the lower of 3, those of the upper lip the largest. *Stamens* 4 didynamous, inserted in the throat of the corolla, exsert; anthers oblong, the cells parallel. *Ovary* imperfectly 2-celled, 4-ovuled; ovules pendulous from the apex of the central placenta; style filiform, shortly bifid. *Drupe* small, obovoid, nearly dry, 1-seeded. *Seeds* conform to the drupe; testa membranous; cotyledons fleshy, unequal, enclosing the remains of part of the placenta; radicle very small, inferior.—*DISTRIB.* Four species, of Burma and Malaya.

Clarke in Fl. Br. Ind. says the drupes are 4-seeded, but every specimen we have examined affords one seed only, accompanied by the remains of the placenta and of 3 abortive ovules.

Involucral bracts reaching 1·5 in. by ·75 in., white-tomentose; leaves beneath and inflorescence more or less ferruginous-villous, and with about 5 to 6 pairs of main nerves 1. *C. vestita*.

Involucral bracts reaching 1·25 in. by ·3 to ·4 in., pale lilac, tomentose; leaves beneath and inflorescence softly tomentose and with about 4 pairs of main nerves 2. *C. tomentosa*.

1. *CONGEA VESTITA*, Griff. Notul. IV. 174 and Ic. Pl. Asiat. t. 458, fig. 21 (1854). A large climbing shrub; branchlets patently fulvous-hirsute, striate. *Leaves* submembranous; ovate or elliptic, sharply acute at apex, obtuse or shortly cordate at base; upper surface scabrous-pubescent, ferruginous-villous on the nerves, lower villous and grey-tomentose; 3 to 7 in. long, 1·5 to 3 in. broad; midrib slightly impressed above; main nerves about 5 to 6 pairs, curving upwards to and along the margin; transverse nervules many, but, like the reticulations, obscure; petiole ·25 to ·5 in. long, with long tawny hispid hairs. *Panicles* very large; bracts leaf-like, whitened; involucral bracts 4, very slightly connate at base, elliptic-obovate, often bifid at apex, reaching 1·5 in. long by ·75 in. broad, densely white-tomentose, with prominent reticulations and 3 pairs of main nerves; flowers rose-coloured. *Calyx* funnel-shaped, ribbed, ·25 to ·35 in. long, densely white-villous without and within; teeth 5, triangular, acuminate. *Corolla*-tube slender below, gradually widening upwards, ·3 to ·35 in. long, glabrous without, also within except a thick villous ring below the throat; upper lip of 2 ovate-oblong erect or recurved lobes, lower of 3 lobes half as long as the upper, the side lobes erect, the third lobe decurved, all thin, glabrous, with brown nervules. *Ovary* oblong-obovoid, glabrous except a few glands at the tip. *Drupe* nearly dry, obovoid. Clarke in Hook. f. Fl. Br. Ind. IV. 603.

PROVINCE WELLESLEY: Arakuda woods, *Ridley* 6993.—DISTRIB. Tenasserim.

2. *CONGEA TOMENTOSA*, Roxb. Cor. Pl. III. 90. t. 293 (1819). A large climbing shrub; branchlets densely tawny-tomentose. *Leaves* coriaceous; ovate, acute at apex, rounded at base; upper surface glabrous except on the nerves, lower tawny-tomentose; 2 to 4 in. long, 1 to 2.5 in. broad; midrib stout; main nerves about 4 pairs, curving upwards, joined by many regular transverse nervules; petiole tawny-tomentose, .25 in. long. *Panicles* terminal, reaching about 6 in. long and 9 in. broad, 3-chotomous, densely tawny-tomentose; branches long- (2 to 2.5 in.) peduncled, racemose, bearing pairs of heads on .5 in. long peduncles; bracts leaf-like, caducous; involueral bracts 4 to each head, pale lilac, ovate or spatulate, slightly emarginate, densely tomentose, .75 to 1.25 in. long, .3 to .4 in. broad, with 4 to 5 pairs of main nerves. *Calyx* funnel-shaped, densely villous especially within, .25 in. long; teeth 5, .05 to .1 in. long, triangular. *Corolla*-tube slender, slightly longer than calyx, glabrous except a ring of villous hairs at the throat within; 2-lipped, the upper lip long deeply bifid, the lower of 3 short lobes, the midlobe the longest. *Stamens* long-exsert. *Ovary* obovoid, pyriform, glandular at tip; style very slender; stigmatic lobes 2. *Drupe* obovoid, nearly dry; exocarp crustaceous, smooth. *Seed* 1, nearly filling the cavity of the drupe, with 3 abortive ovules; testa very thin; cotyledons thick, unequal, somewhat emarginate. *Wight* Ic. t. 1479, 2 or 1565; *Schauer* in DC. Prodr. XI. 623; *Kurz* For. Fl. II. 256; *Miq.* Fl. Ind. Bat. II. 911; *Clarke* in Hook. f. Fl. Br. Ind. IV. 603. *Roscoe* *tomentosa*, Roxb. Fl. Ind. III. 57. *Calochlamys capitata*, Presl Bot. Bemerk. 149.

SOUTH-WEST SIAM: at Poongah, *Curtis* 2903, 2962.—DISTRIB. India (Chittagong), Burma, Siam. Often cultivated.

The involueral bracts of our specimens do not agree very well with those figured in the 'Coromandel Plants,' but they agree better with the authentic specimens. We have not been able to make quite sure whether our specimens belong to type *tomentosa* or to the var. *azurea* (*C. azurea*, Wall. Cat. 1733), but we think to the latter.

The following species seems worthy of description here, as possibly also occurring in the Peninsula.

CONGEA FORBESII, King & Gamble in Kew Bull. 114 (1908). A large climber, spreading over great forest trees; branchlets rather slender, hoary-pubescent. *Leaves* chartaceous; oblong or oblong-lanceolate, shortly acuminate at apex, rounded and slightly cordate at base; upper surface shining, glabrous except the puberulous nerves; lower surface softly pubescent, reddish-brown when dry; 3 to 5 in. long, 1 to 1.5 in. broad; midrib strong, impressed above, as are the 5 to 6 pairs of main nerves which start at about 80° with the midrib and curve upwards to and along the margin; transverse nervules many, horizontal; reticulations netted; petiole .2 in. long, tawny-pubescent. *Panicles* terminal, tawny-pubescent, racemose, reaching about 12 in. in

length and 6 in. in breadth; main branches usually 1 pair only, with slender 1 to 1.5 in. peduncles; heads in pairs on short (.2 to .3 in. long) peduncles, the pairs 1 to 2 in. apart along the raceme: bracts leafy, coloured; involueral bracts 4, grey-tomentose, oblong-spathulate, 1 to 1.5 in. long, .4 in. broad, within them a pair of linear-setaceous bracteoles about .3 in. long; flowers light purple. *Calyx* tubular, funnel-shaped, densely villous on both sides but especially within, .3 in. long; teeth triangular, .075 in. long, acute. *Corolla*-tube cylindric, slender, .3 in. long, glabrous except the ring of villous hairs at the mouth within; 2-lipped, the upper lip of 2 lobes longer than the 3 lobes of the lower, margins of the lobes crenulate. *Ovary* obovoid, glabrous except a few glandular dots at top; style very slender. *Drupe* obovoid, dry; exocarp crustaceous, smooth, tipped with the persistent base of the style. *Seed* 1, with the remains of the placenta and 3 abortive ovules; testa extremely thin, membranous; cotyledons unequal, one concave, the other convex, fleshy, .125 in. in diam., the apex depressed; radicle very small.

SUMATRA: in deep forest. Lampongs, *Forbes* 1567.

Tribe V. AVICENNIEÆ.

15. AVICENNIA, Linn.

Shrubs or small trees with long creeping roots which give out at intervals narrow, conical, leafless suckers. *Leaves* coriaceous, opposite, entire. *Flowers* small, sessile, in capitate pedunculate heads of close centripetal cymes which are in pairs in the upper axils or in short terminal trichotomous thyrsi or corymbs; bracts small, shorter than the calyx. *Calyx* short, 5-partite, unaltered in fruit; segments ovate, concave, deeply imbricate. *Corolla*-tube short, cylindric; lobes 4, subequal or the posterior lobe slightly the largest. *Stamens* 4, inserted on the corolla-throat; filaments short; anthers shortly exsert; cells ellipsoid, parallel. *Ovary* imperfectly 4-celled by a 4-winged central axis; ovules 4, pendulous between the axial wings; style tapering; stigma bifid. *Fruit* a compressed capsule, dehiscent by 2 leathery valves. *Seed* solitary, erect; embryo imperfectly covered by the 2 integuments; albumen none; cotyledons large, longitudinally plicate; the radicle inferior, thick, villous, the plumule conspicuous, developing before the seed falls.—DISTRIB. Muddy estuaries and sea-coasts of the warmer regions of the globe; species 4 or 5.

Leaves obtuse at apex; capsule over 1 in. long; corolla-tube distinct; stamens exsert; style long 1. *A. officinalis*.

Leaves acute or acuminate at apex; capsule under 1 in. long; corolla-tube almost none; stamens included; style very short 2. *A. alba*.

1. AVICENNIA OFFICINALIS, Linn. Sp. Pl. 110 (1753). A small tree with greyish-brown thin bark and many blind root-suckers; branchlets pale brown, subquadrangular, glabrous when old; young ones, young leaves and inflorescence with very close pale tomentum. *Leaves* coriaceous; elliptic-oblong or obovate, obtuse at apex, attenuate at base; upper

surface glabrous, smooth and shining, lower surface pale and with a hard, very thin, grey or tawny tomentum, at length glabrate; 2 to 4 in. long, 1 to 2 in. broad; midrib stout, very prominent; main nerves 6 to 8 pairs, at first straight, then curving to anastomose near the margin; reticulations netted; petiole stout, .25 to .75 in. long. *Flowers* sessile, in small heads on rigid angular peduncles either 2 together in upper axils or several in short terminal thyrsi; bract and 2 bracteoles concave, thick, shorter than the sepals; flowers in each head 3 to 6; corolla orange-yellow. *Calyx*-segments thick, .1 to .3 in. long, ovate or suborbicular, scarious-ciliate on the margins, the lower part of the back pubescent, the rest glabrous. *Corolla*-tube very short, cylindric; lobes 4, ovate, acute or rounded at lip, subequal, .2 in. long, pubescent without, nearly glabrous within. *Stamens* exserted; filaments .1 in. long; anthers .05 in. long; cells parallel, ellipsoid. *Ovary* conoidal, tapering into the style, together .25 in. long; stigmatic lobes curved. *Capsules* 1 to 1.5 in. long, ovoid, compressed, beaked, green with greyish tomentum. *Seed* 1, completely filling the capsule. Schauer in DC. Prodr. XI. 700; Bedd. For. Man. in Fl. Sylv. CLXXIV., and Anal. Gen. t. 22, fig. 2; Brandis For. Fl. 371; Trimen Fl. Ceyl. III. 363; Clarke in Hook. f. Fl. Br. Ind. IV. 604; Miq. Fl. Ind. Bat. II. 912; Koord. & Val. Bijdr. VII. 217; Cooke Bomb. Fl. II. 435; Prain Beng. Plants 838. *A. resinifera*, Forsk.; Dene. in Nouv. Ann. Mus. III. 402. *A. tomentosa*, Br. Prodr. Flor. Nov. Holl. I. 518; Roxb. Fl. Ind. III. 88; Wall. Pl. As. Rar. III. 44, t. 271; Wight Ic. t. 1481; Blume Bijdr. 821; Griff. Notul. IV. 185; Kurz For. Fl. II. 276. *Halodendron Thouarsii*, Roem. & Sch. Syst. III. 485. "*Mangium album*," Rumph. Herb. Amb. III. t. 76. "*Oepata*," Rheede Hort. Mal. IV. t. 45.

PENANG: Wallich 1742; Curtis 3533. MALACCA: Griffith (K.D.) 6069; Maingay (K.D.) 1208. SINGAPORE: T. Anderson 79; River valley road, Ridley 10370; Hullett 163.—DISTRIB. Coasts of India, Ceylon, Burma, Java, eastwards to the Pacific: in tidal creeks and on muddy coasts.

2. *AVICENNIA ALBA*, Blume Bijdr. 821 (1826). A shrub or small tree; branchlets pale brown, shining, obscurely quadrangular; innovations and inflorescence shortly appressed, whitish- or tawny-tomentose. *Leaves* coriaceous; lanceolate, acute or acuminate at apex, attenuate at base; glabrous on both surfaces or whitish-tomentose beneath (especially when young); 2 to 5 in. long, .75 to 2 in. broad; midrib prominent; main nerves 8 to 10 pairs, curving upwards to anastomose near the margin; secondary nerves few, meeting few arched transverse nervules, all somewhat raised on the upper surface; petiole thick, .25 to .5 in. long. *Flowers* sessile, either in small capitate heads or in distichous panicles in short terminal or axillary panicles; rachises and peduncles

angular; bract and 2 bracteoles concave, thick, shorter than the sepals, the bract orbicular, ciliate, the bracteoles ovate, ciliate, acute. *Calyx*-segments thick, .1 in. long, ciliate, slightly pubescent on the back near the base, above glabrous and rugose. *Corolla*-tube very short, sometimes almost none; lobes 4, ovate, concave, acute at tip, the posterior one sometimes bifid, .1 in. long, glabrous. *Stamens* included; filament .03 in. long; anthers .02 in. long, oblong; cells parallel. *Ovary* columnar, with very short conical villous style, together .05 to .1 in. long; stigmatic lobes 2, erect, thick, minute. *Capsules* .5 to .75 in. long, obpyriform, gibbous on one side, acute or acuminate; pericarp green (*Kunstler*) with greyish tomentum. *Seed* 1, completely filling the lower part of the capsule. Wight Ic. t. 1482; Miq. Fl. Ind. Bat. II. 913; Cooke Bomb. Fl. II. 436; Koord. & Val. Bijdr. VII. 221; Prain Beng. Plants 838. *A. officinalis*, Linn., var. *alba*, Clarke in Hook. f. Fl. Br. Ind. IV. 604. *A. resinifera*, Griff. Notul. IV. 186, and in Trans. Linn. Soc. XX. 6, fig. 1. *A. intermedia*, Griff. l. c. *A. officinalis*, Kurz For. Fl. II. 275.

PROVINCE WELLESLEY: in mangrove swamps, *Curtis*. DINDINGS: Pangkore, *Scortechini* 963. MALACCA: *Griffith* (K.D.) 6070, 6071; *Maingay* (K.D.) 1209. SINGAPORE: *Kunstler* (*King's Collector*) 1152. —DISTRIB. India, Burma, Java, Borneo, Celebes, to North Australia, in tidal creeks.

Koorders & Valetton draw attention to the capitate heads shown in Wight's drawing, and refuse to quote t. 1482. We have seen Koorders' Nos. 9696 and 22009 from Java, which have the heads spicate, as do *Kunstler*'s specimens No. 1152. *Haviland*'s Borneo specimens are partly spicate, partly capitate; *Scortechini*'s Pangkore specimens are capitate. But in all the structure of the flowers is the same and agrees with that given in Wight's drawing, so there seems no room for even a variety.

ADDENDA-CORRIGENDA.

VOL. LXXII. II. PART No. 14 (1903).

Page 113, line 21, for "inner" read "upper"

P. 114, l. 7, for "ovate" read "obovate"

P. 117, omit the whole of lines 7, 8 and 9.

P. 152, l. 4 from below, for "PERAKENSIS" read "PERAKENSE"

Pages 187, 188, omit the whole of 19, TRISCIADIA, Hook. fil.

VOL. LXXIII. II. PART No. 15 (1904).

P. 51, l. 23, after "Wallich." insert "PERAK: Wray 2104, 3271; Scortechini; Ridley 8374; King's Collector 5508, 6431, 6545.—DISTRIB. Andaman Islands; Sumatra; Java, Forbes 2504."

P. 51, l. 11 from below, before "flowers" insert "greenish-white"

P. 52, l. 25, after "Flowers" insert "white, sweet-scented,"

P. 57, at top of page, insert "34. KNOXIA, Linn."

" " l. 3 from below, before "CANTHIUM" insert "35."

P. 59, l. 11 from below, for "Fruit when ripe . . . glabrous." read "Fruit oblong, obovoid, 1 in. long, yellow, pulpy, acid in taste."

P. 60, l. 20, for "Fruit unknown." read "Fruit black when ripe."

" " l. 5 from below, after "Fruit" insert "orange,"

P. 62, l. 20, for "my" read "our"

P. 64, l. 12, after "Flowers" insert "rosy-white, nearly 1 in. in diam.,"

P. 66, l. 2, after "bracteolate" insert "; flowers green."

P. 67, l. 13, after "Flowers" insert "white,"

" " l. 7 from below, after "calyx;" insert "flowers white."

P. 68, l. 16, after "pubescent" insert "; flowers white."

" " l. 2 from below, after "bracteoles" insert "; flowers white."

P. 69, l. 18, after "base" insert "; flowers white."

" " l. 4 from below, after "bracteolate" insert "; flowers white."

P. 70, l. 15, after "linear" insert "; flowers white."

P. 73, l. 3, after "bract" insert "; flowers white."

" " l. 9 from below, after "Flowers" insert "red,"

P. 74, l. 22, after "long" insert "; flowers white."

P. 75, l. 3, after "persistent" insert "; flowers white."

" " l. 5 from below, after "tube" insert "; flowers scarlet."

P. 78, l. 8, before "smaller" insert "white and"

P. 79, l. 6, after "shorter" add:—

"Mr. Ridley says this variety is *I. stenophylla*, Ridl. in Trans. Linn. Soc. Ser. 2, iii. 311 (1893), at any rate so far as the Pahang plant is concerned; he considers it a good species."

P. 79, l. 5 from below, after "minute" insert "; flowers orange."

P. 80, l. 5, for "SCORTECHINI" read "SCORTECHINIL"

„ „ l. 15, after "puberulous" insert "; flowers red."

„ „ l. 12 from below, after "minute" insert "; flowers red, orange or yellow."

P. 81, l. 24, after "minute" insert "; flowers orange red."

P. 88, l. 7 from below, after "common" insert ", a sea-shore plant."

P. 89, l. 3 from below, after "flowers" insert "violet,"

P. 91, l. 8, after "long" add:—

"Mr. Ridley thinks it is a new species of *Timonius*."

P. 94, l. 9, after "Flowers" insert "pink,"

„ „ l. 5 from below, after "Flowers" insert "white,"

P. 95, l. 8, omit "*S. longicaulis*, Br. in Wall. Cat. 826."

„ „ l. 20, after "Flowers" insert "white,"

P. 102, after line 12 add as note:—

"Mr. Ridley remarks the occurrence of *Myrmecodia echinata*, Gaudich., which is not rare near the sea—PAHANG: Ridley 1462. SINGAPORE: Ridley 5869, 8067."

P. 105, l. 21, after "pedicels" insert ", white, bracts purple."

P. 106, l. 7, after "long" insert "ochre-yellow, honey-scented." and at line 11 after "Fruit" insert "bright light blue,"

P. 111, l. 20, for "*lucidus*." read "*Lowianus*."

P. 132, l. 3 from below, for "LUCIDUS" read "LOWIANUS"

P. 134, l. 15, for "BC." read "Blume"

VOL. LXXIV. II. EXTRA NUMBER. PART No. 16 (1905).

P. 4, l. 8, for "Scandent" read "Erect"

P. 5, l. 12 from below, after "Fruit" insert "white, fleshy,"

P. 6, l. 5, after "Fruit" insert "white,"

P. 8, l. 23, for "climber" insert "plant, creeping on tree stems, often"

„ „ l. 6 from below, after "Fruit" insert "white, showy,"

P. 37, l. 20, after "obtuse" insert "; flowers lavender-coloured."

P. 39, l. 2, after "24" insert "; Hook. f. Fl. Br. Ind. III. 336;"; line 3, for "*Calcalia*" read "*Cacalia*"; and line 4 for "*E.*" read "*C.*"

P. 48, at the end of Order LXI. COMPOSITE, add:—

“Since the description of this Family was written, the following species have been noticed as additions to the Flora:

Tribe VERNONIEÆ.

Sparganophorus Vaillantii, Gaertn. Fruct. II. 396 t. 165. A roadside weed, introduced from the West Indies, common in Singapore.—*Ridley, Deschamps.*

Vernonia elaeagnifolia, DC. Prodr. V. 22. At Pekan, Pahang, fide *Ridley.*

Tribe ASTEROIDEÆ.

Erigeron linifolius, Willd. Sp. Pl. III. 1955. An escape or garden weed, common.—Penang, *Curtis* 3389, 3401.

Grangea maderaspatana, Poir.; DC. Prodr. V. 373. Kedah, *Curtis* 3809.

Tribe INULOIDEÆ.

Blumea myriocephala, DC. Prodr. V. 445. Selangor, *Curtis*, 2350.

Cæculia axillaris, Roxb. Hort. Beng. 62, fide *Ridley.*

Tribe HELIANTHOIDEÆ.

Enhydra fluctuans, Lour. Fl. Cochinch. 511. Penang, *Curtis* 3455.

Acanthospermum xanthioides, DC. Prodr. V. 521. An introduced weed in Singapore, fide *Ridley.*”

P. 49, line 13, after “Flowers” insert “bright mauve,”

P. 53, l. 10, for “purple” read “pale blue”

P. 54, l. 24, for “adnatus” read “adnatum”

P. 55, l. 5 from below, omit “SINGAPORE; *Lobb.*”

„ „ lines 4 to 2 from below, omit “*Ridley* (Trans. Linn. Soc., &c. . . . common.”

P. 56, l. 14 from below, for “Salian” read “Tahan”

„ „ l. 4 from below, for “marcescent” read “acrescent”

P. 58, l. 19, at beginning insert “PROVINCE WELLESLEY: common.”

P. 61, l. 23, for “microphylla” read “microphyllum”

P. 64, l. 13 from below, for “white” read “pink”

P. 66, l. 11, after “shrub” insert “or small tree or an epiphyte on lofty trees”

P. 66, l. 14, after “paler” insert “often bright red when fresh”

„ „ l. 22, after “Corolla” insert “pink or white,”

P. 67, l. 29, after “long” insert “, pink, fragrant,”

„ „ l. 7 from below, after “Fruit” insert “black, edible,”

P. 72, at the end of *DIPLYCOSIA* add note:—

“*D. lancifolia*, Ridley in Journ. Str. Br. R. As. Soc. No. 39, 15 (1903) from Gunong Benom in Pahang, has been omitted.”

P. 91, at end of *GENTIANACEÆ* add note:—

“Ridley says that *Exacum tetragonum*, *Exacum pedunculatum* and *Canscora diffusa*, only admitted on the authority of Lobb's specimens which are of very doubtful locality, ought probably to be excluded. He would add *Limnanthemum cristatum*, Griseb. found at Singapore and at Batu Pahat river, Johore.”

PART No. 17 (1905).

Page 123, line 5, after “*Berry*” insert “white,”

P. 131, last line, after “1808” insert “SINGAPORE: Changchukang, Ridley 3653, 3844 (*fide* Ridley).”

P. 171, line 28 after “101;” insert “Regensb. Fl. 578 (1855); Walp. Ann. V. 475. *Ceratophorus Leerii*,”; and line 31, for “King's Collector” read “Wray”

P. 175, l. 26, for “(?)” insert “about 20 feet high”; and last line, before “Ridley” insert “in the Bukit Kutu woods,”

P. 191, l. 10, after “60” insert “to 80”; and for “10 to 15 in.” read “3 to 4 feet.”

P. 193, ll. 18, 19, for:—

“It has is” read “old trees of any size have become scarce in a wild state, seedlings being still plentiful, but it is”

P. 196, l. 8, for “(?)” read “reaching 50 to 60 feet in height” and line 29, add:—

“The timber is heavy and is used in house-building (*Ridley*).”

P. 237, l. 1, after “144” insert “; Brand Monog. Sympl. 40.”

P. 254, l. 21, for “7348” read “7848.”

P. 257, last line but two add:—“Remarkable among Jasmines for having white instead of black fruit (*Ridley*).”

P. 272, l. 14, to note add:—

“Ridley says this is *Linociera lancifolia*, Ridley in Journ. Str. Br. R. As. Soc. No. 39, 14 (1903).”

PART No. 18 (1905).

Page 280, line 14, after “sessile” insert “, white,”

P. 284, after line 12, insert note:—

“Ridley says that he found *Ehretia burifolia*, Roxb. Cor. Pl. I. 42, t. 57 along the Rumpin River in Pahang. We have seen no specimens.”

Page 292, line 19, after "Flowers" insert "white,"

P. 295, l. 4, after "Wray 2580!" put ";" instead of "." and for "MALACCA: Bujong" read "Bujong Malacca,"

P. 335, l. 13, add:—"Common on the sea-shore (Ridley)" and to the note after "species." add:—

"Ridley writes that *Solanum mammosum*, Linn. Sp. Pl. 187 should be added as it is thoroughly established and a conspicuous feature of the scenery on waste ground in Selangor and Perak. It is also common in old tin mines. No specimens have been seen."

P. 339, l. 9, for "C." read "P."

P. 340, l. 15, to note add:—

"Ridley says the purple-flowered variety is by far the commonest, but is not wild and is found on waste ground only."

P. 340, last line but 2, for "all" read "some of" and after "provinces" insert "sparingly,"

P. 348, l. 20, delete "Herpestris pygmaea, Griff. Notul. IV. 104."

P. 348, l. 25, after "Flowers" insert "violet with white throat,"

P. 350, l. 8, for "SESSIFLORA," read "SESSILIFLORA,"

P. 352, l. 4 from below, omit "white or white and pink" and after "exserted" add "; tube and back of upper lip cherry red, lower lip white with a yellow central spot, stigmas yellow (Ridley)."

P. 354, l. 3, for "ASIATICA, Linn. Sp. Pl. 619" read "ATROPURPUREA Ridley n. sp."

P. 354, lines 12 to 17, omit all the references.

P. ,, ,, 19, 20, omit "DISTRIB. &c. to end."

P. ,, line 21, for "BENTHAMIANA 226" read "CAELESTIS, Ridley, n. sp."

P. 354, lines 29 to 31, omit all the references.

P. ,, line 22, omit "DISTRIB. &c."

P. 355, at the end of the genus *TORENIA* add note:—

"Ridley says that *T. Benthamiana*, Hance, is often cultivated but is not established. He also says that *T. mucronulata*, Benth. in DC. Prodr. X. 409 should be added with the following localities. PENANG: Waterfall and Government Hill, Curtis, 1837. TRENGGANU: Bundi, Rostado. DINDINGS: Gunong Tungul, Ridley 9444. PAHANG: at Tahan River, Ridley. SINGAPORE: Garden jungle, Bukit Timah, Ridley 6894."

P. 357, l. 8, after "Corolla" insert "light blue,"

PART No. 19 (1907).

Page 399, lines 23, 24, for:—

"But the author gives no explanation of his drawings," insert "and the author uses the term 'funiculus umbilicalis,'"

P. 469, line 16, at the end change "." to ";" and in line 17 omit "*S. caudatus*,"

P. 470, l. 15, for "193." read "192."

P. 532, l. 7 from below, for "SELANGORICA, King & Gamble, n. sp." substitute "CARNOSUM, Merrill & Rolfe in Philipp. Journ. Sc. III. (1908) 121."

P. 533, l. 9, after "all" add "*Oxystelma carnosum*, R. Br. Prodr. Fl. Nov. Holl. 462; Dene. in DC. Prodr. VIII. 543. *Cynanchum carnosum*, Schltr. in Perkins Fragm. Fl. Philipp. 120, *Vincetoxicum carnosum*, Benth. Fl. Austral. IV (1869) 331."

Page 533, l. 11 at end, add "Australia."

P. 543, l. 17, for "Patch" read "Pateh"

P. 546, l. 12, for "Hort. Ham." read "Herb. Buch.-Ham."

P. ,, ,, 4 from below, for "Tjuk" read "Ijuk"

P. 549, at end of PERGULARIA insert note:—

"According to N. E. Brown (Kew Bull. 323 (1907)) the generic name Pergularia really belongs to *Damia* and (This.-Dyer Fl. Cap. IV. i. 775) the species described under *Pergularia* must be renamed under *TELOSMA*, Coville."

P. 554, line 19, omit "MALACCA: Griffith 3764."

P. 574, l. 12, after "rounded" insert "or cuneate"

P. 579, lines 6 to 10, for "Wall. Cat. t. 4545" read "Lindl. Bot. Reg. (1847) t. 54; Hook. Bot. Mag. t. 4545; Wall. Cat. 8171; Dene. in DC. Prodr. VIII. 633; Miq. Fl. Ind. Bat. II. 513."

P. 586, after line 7, insert note:—

"For a discussion of the curious modifications of the leaves of *D. Rafflesiana*, *D. complex*, and other species, see the following: Treub in Ann. Buit. III. 13; Scott & Sargent in Ann. Bot. VII. 243; This.-Dyer in Ann. Bot. XVI. 365; H. H. W. Pearson in Journ. Linn. Soc. XXXV. 376."

PART No. 20 (1907).

Page 637, line 10 from below, for "T. Anders." read "Wall."

P. 641, l. 7, for "E" read "S"

P. 646, lines 12, 13, omit "*H. phlomoides*" and transfer "Miq. Fl. Ind. Bat. II. 779;" to after "DC. Prodr. XI. 90;"

P. 683, line 17, for "Wall." read "Nees"

P. 700, last line of analysis, omit "18. CYMARIA" and insert

"Anthers 2-celled; upper lip of corolla merely notched	..	18. CYMARIA.
Anthers 1-celled; upper lip of corolla 2-lobed .. ..	..	19. ACRYMIA."

P. 701, line 4 from below, after "places" insert "PENANG: Deschamps. PROVINCE WELLESLEY: Ridley 7168. SELANGOR: at Kwala Lumpur, Ridley 10204. SINGAPORE: Hullett 63, 175.

ANDAMANS at Port Blair, *Kurz, King, Prain*. NICOBARS: Car Nicobar, Moos, *King's Collectors*; Katchall, *Kurz*."

P. 702, l. 19, for "PERAK MALACCA" insert "PENANG: *Wallich* 2713 E; at Santong Sotong, *Curtis* 2492. DINDINGS: at Pangkore (marked ? introduced) *Scortechini* 1017. ANDAMANS: S. Andaman, *King*."

P. 702, lines 27 and 30, for "*graveolens*" read "*suaveolens*"

P. 704, line 4, for "PERAK: *Kunstler*" insert "KEDAH: Langkawi, on the small islands, *Curtis* 2577. PERAK: near Bernani River at 300 to 400 ft., *Kunstler* 8813."

P. 705, l. 10 from below, at end, insert "SINGAPORE: *Kunstler* 89."

P. 707, after "Provinces." insert "PENANG: *King, Deschamps*. PERAK: at Jenah, 200 to 300 ft., *Wray* 1759. MALACCA: *Griffith* 3957. SINGAPORE: *Wallich* 2733; *Schomburgk*."

P. 708, lines 19 and 20, for "SINGAPORE 7603!" read "PERAK: Upper Perak, *Wray* 4046; Rawang, *Ridley* 7603. PAHANG: Tahan River, *Ridley* 2131! MALACCA: *Griffith* 3966! SINGAPORE: *G. Thomson*; Bukit Panjang, *Ridley* 3951; Gunong Bintang, *Kunstler* 255"; and at line 22, after "cultivation," add "Sumatra (in Eastern Sumatra, *T. Daud-Herb. Ridley* 11336; at Kitta Djawar in open and sunny waste places in Lampongs, *Forbes* 1416A)."

P. 709, line 9, after "*Wray*" insert "1682."

P. 710, l. 28, for "In all the provinces" read "KEDAH: Langkawi, *Curtis*. PENANG: Balick Polo Road, *Curtis* 868; *Deschamps*. PERAK: *Scortechini*. PAHANG: Katapong, *Ridley* 1286. MALACCA: *Hervey*; *Griffith*. JOHORE: Kwala Kanary, *Lake & Kelsall* 4028. SINGAPORE: *Kunstler* 128; *Hullett* 19; *T. Anderson* 148. NICOBARS: Kamorta, *Kurz*; Car Nicobar, *King's Collectors*."

P. 710, after line 28, at end of *DYSOPHYLLA* insert the following:—

2. *DYSOPHYLLA VERTICILLATA*, Benth. in Wall. Cat. 1544 (1828). An annual herb. Stems laxly branched, rarely simple, 6 in. to 3 ft. high, glabrous or nearly so. Leaves in whorls of 4-10, glabrous, linear, subacute, margin entire or obscurely toothed; 1-3 in. long, .15 to .25 in. wide; petiole short or 0. Flowers in villous or tomentose cylindric terminal spikes, 1-2 in. long, .2 in. in diam.; whorls of cymes close-set throughout. Calyx in fruit .08 in. long, campanulate; teeth subequal, triangular, stellately spreading. Corolla .08 in. long, pinkish; tube slender, hardly exserted; lobes pubescent. Filaments exserted, hairy. Nutlets ellipsoid. Benth. in Wall. Pl. As. Rar. I. 30, in Lab. Gen. & Sp. 159, and in DC. Prodr. XII. 157; Thw. Enum. Pl. Zeyl. 239 (in part); Hook. Fl. Br. Ind. IV. 639. *D. ramosissima*, Benth. in Wall.

Cat. 1543. *D. Benthamiana*, Hance in Ann. Sc. Nat. Ser. 5, V. 234. *Mentha stellata*, Lour. Fl. Cochinchin. 36. *M. verticillata*, Roxb. Hort. Beng. 44, and in Fl. Ind. III. 5. *Pogostemon verticillatus*, Miq. Fl. Ind. Bat. II. 965.

KEDAH: Langkawi, Coah, *Curtis* 2098! DISTRIB.—Throughout South Eastern Asia, and in Australia.

Page 714, line 15, for "PERAK: *Scortechini*" read "KEDAH: Kedah Peak, *Ridley* or *Curtis*. PERAK: Harans, *Scortechini* 788!"

P. 715, l. 6 from below, for "In all the provinces" read "SELANGOR: *Ridley* 7601. ANDAMANS: S. Andaman, *King's Collector*. NICOBARS: Nancowry, *King's Collector*."

P. 717, l. 26, after "escape" add "MALACCA: Bukit Bruang, *Hervey*."

P. 719. l. 10 from below, after "*Deschamps*!" add "; *Hullett* 9. PENANG: *Deschamps*. PROVINCE WELLESLEY: *G. King*. PERAK: Thaipeng, *Scortechini* 7, 482; Telukanson, *Ridley* 10769," and after "*Griffith*!" insert "ANDAMANS: S. Andaman, *King's Collector*."

P. 720, l. 23, after "1115!" insert "at Tanjong Joking, *Curtis* 2491; *Deschamps*. PROVINCE WELLESLEY: Butterworth, *G. King*. MALACCA: *G. King*"; and line 24, after "48!" insert "*Hullett* 9."

P. 721, l. 14, after "places" insert "SELANGOR: Pudok, *Goodenough* 10462. PAHANG: at Pekan, *Ridley* 1164."

P. 722, l. 17, after "7095!" insert "Larut at 500 to 1000 ft., *King's Collector* 2372."

P. 724, l. 18, after "Wray!" insert "Goping, *Kunstler* 467."

P. 725, l. 24, at beginning, insert "PAHANG: at Pulau Tawar, *Ridley* 2148, also at Kwala Tanbeling," and lines 26 to 31, omit "It has *Materials*" and add "*Ridley* has also collected in Johore at Bukit Saga (No. 11130) a plant, also with white flowers, which agrees with *G. oblongum* in every character except in having calyx-teeth much shorter than the tube."

P. 726, l. 3, after "1310!" insert "gathered in Botanic Garden, from a plant sent from Waterloo, Perak, *Curtis* 2166."

P. 727, after line 4, the end of LABIATÆ, insert the following:—

19. ACRYMIA, Prain in Kew Bull. for 1908, 114 (1908).

Undershrubs. Flowers small, in lax, many-flowered, peduncled, raceme-like, axillary cymes. Calyx erect, 10-nerved, the intermediate nerves weaker than the other 5, equally 5-toothed; the tube in fruit urceolate; throat within naked. Corolla-tube slightly enlarged upwards, shortly exserted; limb 2-lipped; lower lip 3-lobed, spreading, the mid-lobe larger than the lateral; upper lip suberect, 2-fid, not arched.

Stamens 4, exserted, didynamous, the upper pair shorter; anthers 1-celled. *Disk* small, equal, entire. *Style-arms* unequal, the upper very short. *Nutlets* obovoid, rugosely pitted; hilum very large, lateral.—*DISTRIB.* Species 1, endemic.

The genus *ACRYMIA* is closely allied to *Cymaria*, with which it agrees as regards inflorescence and fruit, but from which it differs in having a 2-lobed upper lip that does not conceal the 1-celled anthers. Though much smaller, the corolla of *Acrymia* resembles rather closely the corolla of *Ajuga*, a genus in which the anther-cells, though usually discrete, are sometimes at length confluent. In habit, however, *Acrymia* is unlike either of the genera to which it is so closely allied, and recalls that met with in an Indian group of species belonging to the genus *Gomphostemma*, which includes *G. ovatum*, Wall., and *G. Mastersii*, Benth.

ACRYMIA AJUGIFLORA, Prain in Kew Bull. 115 (1908). A dwarf undershrub. *Stems* woody, prostrate and rooting below, 2-3 in. long, densely leafy above. *Leaves* opposite, petioled, elliptic, obtuse, crenate except the sometimes unequally cuneate, or occasionally subtruncate base; dark green above, paler beneath, fulvous-strigose on both sides, especially along the 5-7 pairs of main nerves and the secondary reticulate veins; 4.5-8 in. long, 2-3.5 in. wide; petiole .75-2 in. long, fulvous-strigose. *Cymes* dichotomously branching, with terminal flowers; flowers on the branches secundly arranged; main-peduncles strigose, slender, .75-1.25 in. long; bracteoles subulate, shorter than pedicels. *Calyx* in flower campanulate, .08 in. long, in fruit urceolate, .15 in. long, strigose on the nerves externally; teeth 5, equal triangular as long as the portion of tube above the constriction; pedicels slender, strigose, .07-1 in. long. *Corolla* white, .25 in. long, glabrous; tube shortly exserted; lower lip spreading, 3-lobed, mid-lobe obovate; upper lip suberect, 2-lobed, lobes oblong, hardly exceeding lateral lobes of lower lip. *Filaments* exserted, hirsute at base, glabrous elsewhere; anthers 1-celled. *Nutlets* obovoid, .02 in. long, wide-reticulate; at first sparsely pubescent, at length glabrescent.

PERAK: On limestone rocks, in dense jungle, 500-800 ft., *Kunstler* (*King's Collector*) 10709!

PART No. 21 (1908).

P. 795, l. 8, for "*SPHENODESMA*." insert "*SPHENODESME*."

NOTE.—Since the completion of the Families of the Gamopetalæ, a paper has been read before the Linnean Society by Mr. H. N. Ridley, F.R.S., on a "Collection of Plants made by Messrs. H. C. Robinson and L. Wray on Gunong Tahan, Pahang." It describes a number of new species, and should be consulted by all workers who may make use of the 'Materials for the Flora of the Malay Peninsula.' It was published in Linn. Soc. Journ. Bot. XXXVIII. 301 *et seq.* (1908).

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JOURNAL
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VOL. LXXV.

Materials for a Flora of the Malayan Peninsula No. 22.—By J. SYKES
GAMBLE, C.I.E., M.A., F.R.S., late of the Indian Forest
Department.

FOUR volumes of this work, in 21 Parts, have already appeared, the first three containing the Thalamifloræ, Discifloræ and Calycifloræ, by Sir George King, K.C.I.E., LL.D., F.R.S.; the fourth containing Gamopetalæ by Sir George King and Mr. J. S. Gamble. The first two volumes were entirely Sir George King's own work; in the third volume the large Family of *Leguminosæ* was done by Lt.-Col. D. Prain, at that time Curator of the Herbarium, Royal Botanic Garden, Calcutta, the genus *Sonerila* in *Melastomaceæ* by Dr. O. Stapf of Kew, and the rest by Sir G. King. In the fourth volume, Lt.-Col. Prain also did *Convolvulaceæ*, *Solanaceæ*, *Scrophulariaceæ*, *Labiata* and a few other Families; the *Acanthaceæ* were done by the late Mr. C. B. Clarke, F.R.S.; and the *Gesneraceæ* were compiled from Mr. H. N. Ridley's work on that Family in the Journal of the Straits Branch of the Royal Asiatic Society. The other Families were done by either Sir G. King or Mr. Gamble.

The section of the 'Materials' dealing with the Monocotyledons appeared in 1907-8. It was a separate publication entitled "Materials for a Flora of the Malay Peninsula—Monocotyledons, by H. N. Ridley, M.A., F.R.S., etc., Director of Botanic Gardens, Singapore, S.S. (Methodist Publishing House, Singapore)," and really forms the concluding portion of this work.

This number is the first of Vol. V, which is intended to contain the Monochlamydeæ and the Gymnosperms; and, owing to the sad occurrence of the death of Sir George King which took place almost

on the very day that Part 21—the last one of Vol. IV—appeared, Mr. Gamble is alone responsible for it. He has been promised help by various Botanists, and especially by Major A. T. Gage, I.M.S., the present Superintendent of the Royal Botanic Garden, Calcutta; and hopes that with this kind assistance the whole work may soon be fully completed.

The present contribution contains the account of the Families No. 93 Nyctaginaceæ, No. 94 Amarantaceæ, No. 95 Polygonaceæ, No. 97 Aristolochiaceæ, No. 99 Chloranthaceæ, No. 102 Lauraceæ and No. 103 Hernandiaceæ, all the work of Mr. Gamble except No. 95 Polygonaceæ which has been contributed by Major Gage. The seven Families dealt with contain 33 genera and 189 species, of which 1 genus and 78 species were new. The new species have been published in the Kew Bulletin.

In accordance with the Rules adopted by the Vienna Conference, the measurements in this volume will be given in the metric system; and it is hoped that this change will not prove an inconvenience.

Family XCIII. —NYCTAGINACEÆ.

Herbs, shrubs or trees. *Leaves* usually opposite, entire; stipules 0. *Flowers* hermaphrodite (rarely unisexual), regular, sometimes dimorphous; inflorescence various, the flowers often involucrate. *Perianth* monopetalous, petaloid, usually small; tube persistent, enveloping the fruit; limb 3—5-lobed, persistent or deciduous, the lobes plicate in bud. *Stamens* 1 to 30, hypogynous, sometimes unilateral; filaments usually unequal, inflexed in bud; anthers included or exserted, dorsifixed, didymous. *Ovary* free, 1-celled; ovule solitary, basal, erect; style filiform, involute in bud; stigma small. *Fruit* indehiscent, enclosed in the hardened perianth-tube. *Seed* erect; testa thin, adherent; albumen soft or floury; embryo with convolute or incurved cotyledons; radicle inferior.—**DISTRIB.** Genera about 22, species about 220, in tropical and warm regions.

1. BOERHAAVIA, Linn.

Herbs, erect or diffuse, often divaricately branched. *Leaves* opposite, often in unequal pairs. *Flowers* small, paniculate, umbellate or subcapitate, articulated with the pedicel; bracteoles small, often deciduous, rarely involucrate. *Perianth*-tube long or short, ovoid below, narrowed above the ovary; limb funnel-shaped or campanulate, 5-lobed. *Stamens* 1—5, connate below around the ovary,

exserted; filaments capillary, unequal. *Ovary* oblique, stipitate; ovule erect; stigma peltate. *Fruit* small, enclosed in the ovoid, turbinate or clavate, truncate, ribbed or angled, viscidly glandular perianth-tube; embryo conduplicate; cotyledons thin, broad, the outer the larger, enclosing the soft floury albumen; radicle long.—**DISTRIB.** About 30 species, tropical and subtropical.

BOERHAAVIA DIFFUSA, Linn. Sp. Pl. 3 (1753). A diffuse herb; root fusiform, stout; stems prostrate or ascending, divaricate, thickened at the nodes. *Leaves* opposite, in unequal pairs, ovate or orbicular-ovate, rounded or acute at apex, truncate or cordate or rounded only at base; upper surface rough, lower whitish scaly; larger one of each pair 2—3 cm. long, 1—2 cm. broad, smaller half the size or less; main nerves 3—5 pairs, spreading, the lowest pair near the base; petiole slender, variable in length, up to 2 cm. long. *Flowers* in subcapitate heads, in divaricate slender dichotomously branched terminal panicles; pedicels capillary; bracts small, lanceolate, acute. *Perianth* about 2 mm. long, the lower part of the tube about equalling the upper, the lower glandular enclosing the ovary, the upper glandular, dotted with red in 5 vertical bands, campanulate; lobes 5. *Stamens* 2, slightly exserted; the anthers glandular on the back. *Fruit* about 3 mm. long, obovate truncate, 5-ribbed and glandular. Bl. Bijdr. 733; Choisy in DC. Prod. XIII. 2. 452; Wall. Cat. 6770; Trimen Fl. Ceyl. III. 390; Cooke Bomb. Fl. II. 480. *B. procumbens*, Herb. Banks in Roxb. Fl. Ind. I. 146; Wight Ic. t. 874. *B. repens*, Linn. Sp. Pl. 3; Hook. f. Fl. Br. Ind. IV. 709; Choisy in DC. l. c. 453; Collett Fl. Siml. 410 t. 131; Prain Beng. Plants 862.—‘*Talu-Dama*’ Rheede Hort. Mal. VII. 105. t. 56.

PENANG: *Curtis!* *Deschamps!* **PROV. WELLESLEY:** *Ridley* 6983! **SINGAPORE:** *Lobb* 309!; *Ridley* 9131! a common weed of roadsides and cultivated fields.—**DISTRIB.** India, Ceylon, Malay Archipelago, tropical and subtropical Asia, Africa and America.

Family XCIV.—AMARANTACEÆ.

Herbs, rarely shrubs, erect or with climbing branches. *Leaves* opposite or alternate, exstipulate. *Flowers* usually hermaphrodite, rarely polygamous or dioecious, small, usually in terminal and axillary simple or paniced spikes, cymes or clusters, the outermost flowers of a cluster sometimes deformed; bracts hyaline or scarious; bracteoles 2, scarious. *Perianth* of usually 5 segments, free or slightly connate below, scarious or hyaline, persistent, imbricate,

nerved. *Stamens* 1—5, opposite the perianth segments; filaments free or connate below in a membranous hypogynous cup, often alternating with membranous staminodes; anthers dorsifixed, 1- or 2-celled. *Ovary* 1-celled, ovoid ellipsoid or globose; ovules 1 or more, amphitropous, erect or suspended from basal funicles; style sometimes simple or obsolete with capitellate stigma, sometimes 2—3-fid with acute stigmas, or styles 2 or 3 papillosely stigmatic on the inner face, erect or recurved. *Fruit* a membranous utricle, rarely a berry or a capsule, breaking irregularly or circumscissily, supported by the persistent perianth. *Seed* erect or inverted, orbicular ovate or reniform, compressed; testa crustaceous; tegmen, if present, membranous; embryo horseshoe-shaped or annular, surrounding a floury albumen.—**DISTRIB.** Genera 48, species about 500, tropical and subtropical.

Anthers 2-celled:—

Ovary 2— ∞ -ovuled; leaves alternate (Tribe I. CELOSIEÆ):—

- | | |
|------------------------------------|---------------|
| Fruit a berry; shrubby | 1. DEERINGIA. |
| Fruit membranous; herbaceous | 2. CELOSIA. |

Ovary 1-ovuled (Tribe II. AMARANTEÆ):—

Ovule erect; leaves alternate:—

- | | |
|--|---------------|
| Flowers 2-sexual, capitate; utricle circumsciss .. | 3. ALLMANIA. |
| Flowers unisexual, in large clusters; utricle circumsciss or indehiscent | 4. AMARANTUS. |

Ovule suspended from a basal funicle; leaves opposite:—

Flowers clustered, 1—3 perfect, surrounded by deformed ones:—

- | | |
|---------------------------------------|--------------|
| Stamens with interposed staminodes .. | 5. CYATHULA. |
| Stamens without staminodes | 6. PUPALIA. |

Flowers all perfect:—

- | | |
|--|------------------|
| Staminodes 0; spikes short; perianth-segments soft | 7. PSILOTRICHUM. |
|--|------------------|

Staminodes present:

- | | |
|---|-----------------|
| Spikes rather short; perianth-segments soft, often woolly | 8. ÆRUA. |
| Spikes long; perianth-segments spinescent .. | 9. ACHYRANTHES. |

Anthers 1-celled; ovary 1-ovuled; ovule suspended from a basal funicle; leaves opposite (Tribe III. GOMPHRENEÆ):—

- | | |
|---------|--------------------|
| | 10. ALTERNANTHERA. |
|---------|--------------------|

The following plants seem to be commonly cultivated in gardens, besides some of these described.

Telanthera ficoidea, Moq. in DC. Prodr. xiii. 2. 363 (1849), a native of Brazil and used for edgings and carpet borders, the leaves being of a fine crimson colour.

SINGAPORE: *Deschamps*!

Gomphrena globosa, Linn. Sp. Pl. 224 (1753) the 'Globe Amaranth' probably coming from America, with large globose yellow or crimson heads of flowers. Hook. f. Fl. Br. Ind. IV. 732.

SINGAPORE: *T. Anderson* 80!

1. DEERINGIA, BROWN.

Herbs or rambling or climbing shrubs. *Leaves* alternate, petiolate, entire. *Flowers* 1—2-sexual, small, in simple or paniced spikes or racemes, or sometimes fascicled; bract and 2 bracteoles scarious. *Perianth*-lobes 5, oblong, imbricate, spreading in fruit, subequal. *Stamens* 4—5, the filaments broadened and connate at the base in a cup, slender above; anthers reniform-oblong, 2-celled. *Ovary* ovoid or subglobose; stigmas 2—4, subulate; ovules few or many, on long funicles from the base. *Fruit* a globose berry or circumsciss utricule, seated on the spreading persistent perianth. *Seeds* few or many, reniform, compressed; testa crustaceous, punctulate; embryo annular, surrounding the farinaceous albumen; cotyledons linear, plano-convex; radicle descending. **DISTRIB.** Species 5—6, Asiatic, Australian and Pacific, one in Madagascar.

Flowers, in long paniced racemes; stamens exsert;

seeds few, under 6 1. *D. celosioides*.

Flowers, in shortspikes; stamens scarcely exsert; seeds

very many 2. *D. indica*.

1. DEERINGIA CELOSIODES, Brown Prodr. Fl. Nov.-Holl. I. 413 (1810). A woody climbing shrub; branchlets long, slender, climbing, blackish when dry. *Leaves* membranous, glabrous, ovate or ovate-lanceolate, acuminate at apex, rounded or deltoid-acute, sometimes cordate, often unequal at base; upper surface blackish when dry, lower pale; 5—10 cm. long, 4—5 cm. broad but often less; midrib slender, main nerves 7—10 pairs, branching, prominent beneath and joined by irregular transverse nervules; petiole slender, 1—2.5 cm. long. *Flowers* small, in long slender racemes in terminal drooping panicles often 30—40 cm. long; bract and 2 bracteoles ovate acuminate, scarious. *Perianth*-lobes oblong, obtuse, 1—1.5 mm. long, scarious on the margins. *Stamens* exsert; anthers oblong-reniform. *Ovary* depressed globose; stigmas 3, papillose. *Fruit* a succulent scarlet berry about 5 mm. in diam.; pericarp rather thin; seeds about 3—6, black, punctulate. Roxb. Fl. Ind. I. 682 and ed. Carey and Wall. II. 511; Wight Ic. t. 728; Wall. Cat. 6888; Dalz. & Gibs. Bomb. Fl.

214; Bot. Mag. t. 2717; Endl. Iconog. t. 62; Miq. Fl. Ind. Bat. I. 1. 1025; Benth. Fl. Austral. V. 209; Baill. Hist. des Pl. IX. 157. t. 230. 231; Hook. f. Fl. Br. Ind. IV. 714; Collett Fl. Siml. 412; Brandis Ind. Trees 518; Prain Beng. Plants 866; *D. baccata*, Moq. in DC. Prodr. XIII. 2. 236; Engl. & Prantl Naturl. Pflanzenfam. III. 1a. 97. t. 49. *D. indica*, Retz in Bl. Bijdr. 542; *Cladostachys frutescens*, Don Prodr. Fl. Nep. 76; Miq. l. c. excl. syn. *Blitum frutescens*, Rumph. Herb. Amb. V. 235 t. 83, fig. 2.

PERAK: at Batu Kuran, *Scortechini* 1593! DISTRIB. India, Burma, Malay Islands, China, Australia.

2. *DEERINGIA INDICA*, Zoll. Syst. Verz. Pl. Jav. 110 (1854). A herbaceous shrub, reaching 1 to 1.5 m. in height; branchlets rather fleshy, angled when dry, glabrous. *Leaves* membranous; lanceolate or elliptic-lanceolate, acuminate at apex, cuneate-acuminate at base; glabrous on both surfaces, pale beneath when dry; 10—20 cm. long, 5—8 cm. broad; midrib rather broad; main nerves 8—11 pairs, the lowest pair rather oblique, the rest nearly at right angles to the midrib, curved near the margin; secondary nerves few; transverse nervules irregular, obscure; petiole slender, 1.5 to 2, sometimes to 4 cm. long. *Flowers* in short axillary glabrous spikes 1—4 cm. long; bract and bracteoles ovate, acute or obtuse, scarious. *Perianth* lobes oblong, acute, concave, scarious on the margins, 2.5—3 mm. long. *Stamens* scarcely exsert; filaments filiform above, gradually broadening to join in a cup 1 mm. long; anthers oblong-reniform. *Ovary* subglobose; stigmas 3, spreading, papillose. *Fruit* a white subglobose berry about 5 mm. in diam.; pericarp thick, fleshy; seeds many (up to 50), angular-reniform, beaked, black, punctulate. Moq. in DC. Prodr. XIII. 2, 236; Miq. Fl. Ind. Bat. I. 1026.

PERAK: at Kwala Dipang, *Ridley* 9583! *Scortechini*! at Waterloo, *Curtis* 2691! near Goping, Larut, on limestone at 150—300 m. alt. *King's Collector* 4611! DISTRIB. Java, the Moluccas and Philippine Islands.

2. *CELOSIA*, Linn.

Herbs or rarely shrubs, erect or with climbing branches. *Leaves* alternate. *Flowers* hermaphrodite, in dense terminal and axillary spikes, white or pink, shining; bract and bracteoles scarious. *Perianth*-lobes 5, slightly connate below, scarious, imbricate, oblong or lanceolate, acute or obtuse, longitudinally nerved, erect in fruit. *Stamens* 5; filaments slender, connate below in a membranous hypogynous cup; anthers 2-celled, dorsifixed. *Ovary* 1-celled, ovoid or sub-

globose; ovules 2 or more on long funicles from the base of the ovary; style 0 or short or long, and sometimes elongating after flowering; stigma simple or 2—3, subulate. *Fruit* a utricle dehiscing in circumsciss fashion near the middle, membranous or sometimes coriaceous. *Seeds* 2 or more, erect, lenticular; testa crustaceous, black, shining or dull; embryo annular, surrounding the floury albumen; cotyledons linear; radicle descending or ascending. *DISTRIB.* About 35 species in tropical Asia, Africa and America.

1. *CELOSIA ARGENTEA*, Linn. Sp. Pl. 205 (1753). A glabrous annual herb, reaching 30 cm. to 1 m. in height; stem erect, branches grooved. *Leaves* variable, linear or linear-lanceolate, acuminate at apex and at base, glabrous, entire, 2—10 cm. long, 5—25 mm. broad; nerves irregular; petiole 0 or very short and slender. *Flowers* in dense terminal cylindric spikes, 3 to 25 or more cm. long, at first pink then becoming shining white, sometimes branching at the apex cockscomb-fashion; bract and bracteoles lanceolate, acuminate or awned, scarious, 4—5 mm. long. *Perianth*-lobes linear-lanceolate, sharply acuminate, scarious, about 8 mm. long, 3-nerved. *Stamens* with slender filaments about 3 mm. long, combined below in a cup 2 mm. deep; anthers linear, 1—1.5 mm. long, the bases finally divaricate. *Ovary* ovoid, very thin; style slender, 5 mm. long; stigma small. *Utricle* 3—4 mm. long, ellipsoid, tapering into the persistent style, circumsciss about the middle. *Seeds* 4—8, lenticular, more or less compressed, 1—5 mm. in diam.; testa black, shining. Willd. Sp. Pl. I. 1197; Roxb. Fl. Ind. I. 678 and ed. Carey & Wall. II. 507; Dalz. and Gibs. Bomb. Fl. 215; Wight Ic. t. 1767; Wall. Cat. 6916; Bl. Bijdr. 543; Miq. Fl. Ind. Bat. I. 1. 1028; Moq. in DC. Prodr. XIII. 2. 242; Hook. f. in Fl. Br. Ind. IV. 714; Trimen Fl. Ceyl. III. 393; Cooke Bomb. Fl. II. 486; Prain Beng. Plants 867; Engl. & Prantl Naturl. Pflanzenfam. III. 1.a. 99, t. 51. *C. margaritacea*, Linn. l.c.; Wall. Cat. 6917; Don Prodr. Fl. Nep. 76; Baill. Hist. des Pl. IX. 157 tt. 228, 229. 'Belutta-adeca-manjen' Rheede Hort. Mal. X. 75, 77. tt. 38, 39.

PERAK: river Pluss, *Wray* 45! *PAHANG*: at Temerloh, *Ridley* 2253! *MALACCA*?: *Griffith* 4181-2! *DISTRIB.* Throughout India, Ceylon, Tropical Asia, Africa, America: in fields, native country unknown.

3. *ALLMANIA*, BROWN.

Erect or diffuse herbs. *Leaves* alternate; linear, obovate or spatulate, entire. *Flowers* hermaphrodite, in terminal and axillary,

sessile or pedunculate, globose or ovoid heads; bract 1, bracteoles 2, scarious. *Perianth*-segments 5, equal, imbricate, free or nearly so, scarious, oblong-lanceolate, nerved, erect in fruit. *Stamens* 5, united below in a membranous hypogynous cup; filaments slender; anthers small, 2-celled, dorsifixed. *Ovary* ovoid, 1-celled, narrowed into a long straight style; stigma capitate, 2-lobed; ovule solitary, erect. *Fruit* a subglobose or ovoid circumsciss membranous utricle. *Seed* 1, orbicular, flattened; testa crustaceous, black, with a basal cup-shaped aril; embryo annular, surrounding copious mealy albumen; cotyledons linear; radicle inferior. **DISTRIB.** About 3 species, in Tropical Asia.

1. *ALLMANIA NODIFLORA*, Br. in Wall. Cat. 6890 (1828). A diffuse annual (or sometimes perennial?) herb; branchlets angular, dichotomously divaricate, pale when dry, glabrous or slightly puberulous. *Leaves* variable, linear-lanceolate to oblong or spatulate, often mucronate at apex; petiole 0 or slender. *Flowers* in globose sessile or shortly pedunculate axillary white or brown heads 10—15 mm. in diameter; bract linear-lanceolate, 4—5 mm. long, bracteoles similar, rather shorter, keeled. *Perianth*-lobes oblong-lanceolate, acuminate, 5 mm. long, strongly 1-nerved, shortly connate at the base. *Ovary* ovoid, membranous; style 1.5 mm. long; stigma small, capitate, very shortly 2-lobed. *Utricle* membranous, hyaline. *Seed* large, nearly as large as the utricle, orbicular, flattened; aril cup-shaped, 2-lobed. Hook. f. Fl. Br. Ind. IV. 717; Cooke Bomb. Fl. II. 487; Prain Beng. Plants 867; Engl. & Prantl Naturl. Pflanzenfam. III. 1a. 102, t. 55. *Celosia nodiflora*, Linn. Sp. Pl. 298. *Achyranthes nodiflora*, Roxb. Fl. Ind. I. 678. *Chamissoa nodiflora*, Mart.; Moq. in DC. Prodr. XIII. 2. 249; Miq. Fl. Ind. Bat. I. 1. 1029. *C. aspera*, Wight Ic. t. 1772. *C. dichotoma*, Wight Ic. t. 1771.

DISTRIB. India, Ceylon, Malay Peninsula and Archipelago, China.

VAR. *esculenta*, Hook. f. *Leaves* very narrow linear, 3—5 cm. long. *A. esculenta*, Br. in Wall. Cat. 6892; Moq. l.c. 249.

MALACCA: Griffith 4182! **Cuming** 2297! **PAHANG:** Ridley 1409! **SINGAPORE:** Ridley 9493!

VAR. *procumbens*, Hook. f. *Leaves* spatulate or oblanceolate, 3—3.5 cm. long, 10—12 mm. broad. Wall. Cat. 6980 E *in part. A. nodiflora*, Wight Ic. t. 1770.

SINGAPORE: Ridley 3381!

4. AMARANTUS, Linn.

Annual herbs. *Leaves* alternate, petiolate, usually entire. *Flowers* small, monœcious or polygamous, in cymules of three or more, arranged in axillary clusters or dense terminal and axillary spikes or panicles; bract 1, bracteoles 2. *Perianth* of 3 or 5 membranous equal or subequal segments; in ♂ ovate-lanceolate, in ♀ oblong or spatulate. *Stamens* 5 or less, free; anthers 2-celled; staminodes 0. *Ovary* compressed, ovoid, 1-celled; style short or 0; stigmas 2—3, filiform or subulate; ovule 1, erect. *Fruit* an orbicular or ovoid compressed utricle, indehiscent or circumsciss. *Seed* erect, orbicular, compressed; testa crustaceous; embryo annular, enclosing floury albumen; cotyledons linear; radicle inferior. **DISTRIB.** Several species, of which some cultivated; tropical or subtropical.

Perianth-lobes and stamens 5 each; utricle circumsciss:

Leaf axils spinous	1. <i>A. spinosus</i> .
Leaf axils not spinous	2. <i>A. caudatus</i> .

Perianth-lobes and stamens 3 each; no spines:

Utricle circumsciss; perianth-lobes, bracts and bracteoles long-awned	3. <i>A. gangeticus</i> .
Utricle indehiscent; perianth-lobes, bracts and bracteoles shortly-awned	4. <i>A. viridis</i> .

1. AMARANTUS SPINOSUS, Linn. Sp. Pl. 991 (1753). An erect glabrous herb. 30–60 cm. high; stems hard, often reddish, with many grooved branches and usually sharp divaricate spines usually in pairs at the leaf axils, 15 mm. long or less. *Leaves* membranous; ovate or oblong, obtuse and sharply mucronate at apex, cuneate at base, glabrous above, sometimes scurfy beneath; 3–8 cm. long, 1–4 cm. broad; main nerves numerous, about 10 pairs, slender, prominent beneath; petiole slender, 1–6 cm. long. *Flowers* very numerous, in cymules of 3 or more in dense axillary clusters and in terminal and axillary dense or interrupted spikes, the upper flower in the spikes usually ♂, the lower ♀ or the ♂ and ♀ mixed; bracts and bracteoles linear-lanceolate, sharply mucronate. *Perianth*-lobes 5: in ♂ ovate-lanceolate, 1-ribbed, scarious, mucronate, 2–3 mm. long; in ♀ shorter, obovate or spatulate. *Stamens* 5; anthers oblong; filaments flattened. *Ovary* ovoid; stigmas 2–3, subulate. *Utricle* circumsciss about the middle, membranous, rugose. *Seed* about 1 mm. in diam.; testa black, shining. Moq. in DC. Prodr. XIII. 2. 260; Willd. Hist. Amarant. 38. t. 4. fig. 8; Roxb. Fl. Ind. III. 611; Dalz. and Gibs. Bomb. Fl. 216; Wight Ic. t. 513; Wall. Cat. 6894; Bl. Bijdr. 540; Miq. Fl. Ind. Bat. I. i. 1031; Hook. f. Fl. Br. Ind.

IV. 718; Trimen Fl. Ceyl. III. 396; Cooke Bomb. Fl. II. 489; Prain Beng. Plants 869.

PENANG: road sides and waste places, *Deschamps*! PROVINCE WELLESLEY: at Krian, *Ridley* 9419! MALACCA: *Griffith* 4183 B! SINGAPORE: *Ridley* 8920! DISTRIB. India, Ceylon, Malay Archipelago, etc.

2. *AMARANTUS CAUDATUS*, Linn. Sp. Pl. 990 (1753). An erect glabrous herb; stems striate. *Leaves* membranous; elliptic, or ovate-lanceolate, obtuse at apex, cuneate at base; both surfaces glabrous, often dotted; 3–7 cm. long, 2–4 cm. broad; main nerves 8–10 pairs, prominent beneath; petiole slender 3–5 cm. long. *Flowers* very numerous, in cymules in dense clusters axillary or along the rachis of terminal or axillary drooping spikes 10–20 cm. long; bracts obovate, sharply long mucronate. *Perianth*-lobes 5, oblanceolate, mucronate, keeled. *Stamens* 5; anthers oblong. *Ovary* ovoid; stigmas 2–3, often thick. *Utricle* circumsciss about the middle, membranous, rugose. *Seed* about 1 mm. in diam.; testa black, shining. Moq. in DC. Prodr. XIII. 2. 255; Wall. Cat. 6907; Willd. Hist. Amarant. 36; Hook. f. Fl. Br. Ind. IV. 719; Prain Beng. Plants 870. *A. cruentus*, Willd.; Roxb. Fl. Ind. III. 610. *A. caudatus* and *A. Alopecurus*, Hochst.

SINGAPORE: *Ridley* 9100!, 10403! 10443! apparently a garden weed; *Deschamps*! DISTRIB. cultivated and run wild in most tropical countries.

This seems to be merely a small weedy form of *A. caudatus* and except for the absence of spines comes very close to *A. spinosus*.

3. *AMARANTUS GANGETICUS*, Linn. Syst. Nat. ed. 10, 1268 (1759). An erect glabrous herb, 60–120 cm. high; stem stout, branching, grooved. *Leaves* membranous, lanceolate, ovate, rhomboid-ovate or deltoid-ovate, obtusely acute and mucronate at apex, rounded and then acuminate at base and decurrent on the petiole; both surfaces glabrous, white-dotted when dry; 5–15 cm. long, 2–10 cm. broad; main nerves about 10 pairs, prominent; petiole slender, 2–8 cm. long, the upper half bordered by the decurrent margins of the blade. *Flowers* very numerous, in cymules clustered in the axils of the leaves and also forming a long terminal more or less interrupted spike, the ♂ and ♀ mixed; bract ovate, scarious, with a long slender awn 4 mm. long; the bracteoles rather shorter, less awned. *Perianth*-lobes 3, lanceolate, long-awned, up to 4 mm. long, those of ♂ shorter and less awned. *Stamens* 3; anthers oblong; filaments slender. *Ovary* ovoid; stigmas 3, subulate. *Utricle* circumsciss about the

middle, membranous, rugose. *Seed* 1—1.5 mm. in diam., flattened; testa shining, black. Willd. Hist. Amarant. t. 6, f. 11; Roxb. Fl. Ind. III. 606; Wall. Cat. 6896 *excl. C.*; Moq. in DC. Prodr. XIII. 2. 261; Miq. Fl. Ind. Bat. I. 1. 1033; Hook. f. Fl. Br. Ind. IV. 719; Trimen Fl. Ceyl. III. 396; Cooke Bomb. Fl. II. 439; Prain Beng. Plants 870. *A. tricolor*, Willd. Sp. Pl. IV. 333; Roxb. l. c. 608; Wall. Cat. 6902. *A. lanceolatus*, Roxb. l. c. 604; Wall. Cat. 6895. *A. tristis*, Willd. l. c. 385; Roxb. l. c. 604; Wall. Cat. 6904, A. C.; Wight Ic. t. 713. Dalz. and Gibs. Bomb. Fl. 215. *A. oleraceus*, Willd. l. c. 386; Roxb. l. c. 605; Wight Ic. t. 715. *A. polygamus*, Willd. l. c. 384; Roxb. l. c. 603; Wall. Cat. 6899 *excl. D.*; Wight Ic. t. 714. *A. lividus*, Willd. l. c. 536; Roxb. l. c. 605; Wall. Cat. 6896 C. *A. melancholicus*, Willd. l. c. 383; Roxb. l. c. 608.

PENANG: about George Town, *Deschamps*! SINGAPORE: Macpherson road, *Ridley* 6256! DISTRIB. Tropical regions, cultivated.

4. AMARANTUS VIRIDIS, Linn. Sp. Pl. Ed. 2. 1405 (1763). An erect branching glabrous herb 30—60 cm. high, the branches grooved, often reddish. *Leaves* membranous, ovate or deltoid-ovate, obtuse and usually notched at apex, cuneate or truncate at base: both surfaces more or less white-dotted when dry; 2—8 cm. long, 1—5 cm. broad; main nerves about 6 pairs, slender; petiole slender, 1—6 cm. long. *Flowers* shortly pedicelled, in small cymules in axillary clusters and in terminal and axillary slender more or less interrupted paniculate racemes; bract and bracteoles ovate, acute, green-keeled, shorter than the perianth-lobes. *Perianth-lobes* 3, in ♂ ovate-acuminate, in ♀ obovate, mucronate, membranous, green-keeled, 1—1.5 mm. long. *Stamens* 3; anthers linear-oblong; filaments short, slender. *Ovary* oblong-obovate; style thick; stigmas 2—3, subulate. *Utricle* suborbicular, indehiscent, membranous, rugose, 1.5 mm. in diam., surmounted by the persistent style. *Seed* lenticular, smooth, shining, black, 1 mm. in diam. Roxb. Fl. Ind. III. 605; Hook. f. Fl. Br. Ind. IV. 720; Trimen Fl. Ceyl. III. 397; Cooke Bomb. Fl. II. 490; Prain Beng. Plants 871. *A. polystachyus*, Ham. in Wall. Cat. 6901. *A. fasciatus*, Roxb. l. c. 609; Wight Ic. t. 717. *Euxolus caudatus*, Moq. in DC. Prodr. XIII. 2. 274; Wight Ic. t. 1773; Miq. Fl. Ind. Bat I. i. 1035.

MALACCA: *Griffith*! SINGAPORE: *Kurz*! *Hullett* 241! *Ridley* 4690! *Deschamps*!—DISTRIB. All tropical and warm countries, a weed of cultivation.

5. CYATHULA, Lour.

Herbs or undershrubs. *Leaves* opposite, petiolate, entire.

Flowers small, hermaphrodite, in large or small, bracteate and bracteolate, spicate or capitate clusters; perfect flowers 1—3 in each cluster, surrounded by imperfect ones. *Perianth*-segments 5, scarious, 1-nerved, acuminate or with hooked rigid awns; in the imperfect flowers reduced to hooked rigid awns. *Stamens* 5; filaments connate below with intervening lacerate or 2—3-fid staminodes into a hypogynous membranous cup; anthers 2-celled. *Ovary* obovoid, 1-celled; ovule solitary, pendulous from a long basal funicle; style simple, filiform; stigma capitellate. *Fruit* an ovoid membranous utricle enclosed in the perianth, its apex areolate. *Seed* inverse, oblong; testa coriaceous, tegmen membranous; embryo annular; cotyledons linear-oblong, flat, surrounding the farinaceous albumen; radicle erect.—**DISTRIB.** About 10 species in tropical and subtemperate Asia, Africa and America.

1. *CYATHULA PROSTRATA*, Blume Bijdr. 549 (1825). A slender annual herb, prostrate below, erect above, thickened and rooting at the lower nodes; stem angular, glabrous or scaberulous, trichotomously branched above, upper branchlets and rachis densely hispid-tomentose. *Leaves* elliptic-rhomboid or ovate, acute at apex, cuneate at base; both surfaces strigosely hispid, lower often reddish; 2—6 cm. long, 1—3 cm. broad; main nerves 4—6 pair, prominent; petiole very short, sometimes 0. *Flowers* pale violet, in small drooping clusters arranged in terminal spicate pedunculate racemes 10—15 cm. long; pedicels very short; bract and bracteoles ovate, acuminate, hispid-pubescent. *Perianth*-lobes of the 2—3 perfect flowers 5, lanceolate, acuminate, 3-nerved, hispid, 2—2.5 mm. long: those of imperfect flowers similar or reduced to hooked awns. *Stamens* 5 with slender filaments and minute orbicular anthers, alternating with short bifid staminodes and forming below a hyaline cup. *Ovary* obovoid, glabrous; style slender; stigma capitellate. *Utricle* thinly membranous, ovoid, surmounted by the remains of the style. *Seed* 1—1.5 mm. long, oblong-ellipsoid, testa smooth, shining; cotyledons oblong, flat. Moq. in DC. Prodr. XIII. 2. 326; Dalz. and Gibs. Bomb. Fl. 219; Hook. f. Fl. Br. Ind. IV. 723; Trimen Fl. Ceyl. III. 398; Cooke Bomb. Fl. II. 496; Prain Beng. Plants 872. *C. repens*, Moq. l. c. 330. *C. geniculata*, Lour. Fl. Cochinch. I. 112; Miq. Fl. Ind. Bat. I. 1. 1045. *Achyranthes prostrata*, Linn. Sp. Pl. Ed. 2. 296; Roxb. Fl. Ind. I. 674 and Ed. Carey and Wall. II. 501. *Desmochaeta prostrata*, DC. Cat. Hort. Monsp. 102; Wight Ic. t. 733. *D. patula*? Wall. Cat. 6937; *D. repens*, Roem. and Sch. Syst. V. 552; Wall. Cat. 6938. 'Scheru-cadelari' Rheede Hort. Mal X. 157. t. 79.

PENANG: *Curtis* 17! 944! *Deschamps*! MALACCA: *Griffith*! *G. King*! *Harvey*! *Hullett*! PERAK: *Scortechini*!; at Jenah, etc., *Wray* 1754! 3489! 3494! JOHORE: at Kota Tingji, *Ridley* 5726!—DISTRIB. India, Ceylon, Malay Archipelago (Java, *Forbes* 535! Sumatra, *Forbes* 1242!) and through the tropics of the World.

6. PUPALIA, Juss.

Herbs or undershrubs. *Leaves* opposite, petiolate, entire. *Flowers* green, hermaphrodite, fascicled in simple or paniculate spikes, fascicles with 1—2 perfect flowers, the rest imperfect; bract and bracteoles scarious, awned. *Perianth*-segments of perfect flowers 5, nearly equal, lanceolate, acuminate, 3—5-nerved; those of imperfect flowers reduced to awns with spreading hooked bristles. *Stamens* 5; filaments slender, subulate, shortly combined at the base; anthers 2-celled; staminodes 0. *Ovary* ovoid, 1-celled; ovule 1, pendulous from a long basal funicle; style simple; stigma capitate. *Fruit* an ovoid membranous compressed utricle, enclosed in the perianth, the top areolate. *Seed* inverse, lenticular, rostellate; testa thinly crustaceous; tegmen membranous; embryo annular; cotyledons linear-oblong, flat, surrounding the farinaceous albumen; radicle ascending.—DISTRIB: Species 5, Asiatic and African.

1. PUPALIA ATROPURPUREA, Moq. in DC. Prodr. XIII. 2. 331 (1849). A slender, erect, annual or biennial, herb reaching 60 to 150 cm. in height; branches long, straggling or semi-scandent, glabrous, often tinged with purple. *Leaves* membranous, ovate or elliptic-lanceolate, acuminate and mucronate at apex, suddenly contracted at base; both surfaces glabrous or nearly so, white-punctulate when dry; 2—10 cm. long, 1—5 cm. broad; main nerves distant, about 6 pair; petiole slender, 6—18 mm. long. *Flowers* in sessile clusters in lax-pedunculate terminal spikes, up to 25 cm. long; bracts small, ovate; acuminate, persistent on the rachis; bracteoles 2, larger, ovate, strongly keeled and mucronate, 4 mm. long, deciduous with the flower cluster. *Perianth*-segments 5, ovate-lanceolate, mucronate, 4 mm. long, lanate, 3—5-nerved; those of imperfect flowers reduced to glochidiate purple hooked awns. *Stamens* 5; anthers suborbicular, minute; filaments slender, very thin, joined at base in a shallow hyaline cup. *Ovary* obovate; style slender, persistent in fruit. *Utricle* very thin. *Seed* oblong, 1—2 mm. long, truncate at both ends; testa black, crustaceous; tegmen membranous; cotyledons short; radicle thick and long. Dalz. and Gibs. Bomb. Fl. 219; Miq. Fl.

Ind. Bat. I. 1046; Hook. f. Fl. Br. Ind. IV. 723; Trimen Fl. Ceyl. III. 399; Cooke, Bomb. Fl. II. 497; Prain Beng. Plants 872. *Achyranthes lappacea*, Linn. Sp. Pl. Ed. 2. 95, excl. *Syn. Ed. 1*; Roxb. Fl. Ind. I. 673, and Ed. Carey and Wall. II. 500. *A. atropurpurea*, Lamk. Dict. I. 546. *Desmochæta atropurpurea*, DC. Cat. Hort. Monsp. 102; Wall. Cat 6933 excl. K; Wight Ic. t. 731. 'Wellia Codiveli' Rheede Hort. Mal. X. 117 t. 59.

SINGAPORE AND PENANG: *Wallich*.—DISTRIB. India, Ceylon, Java, Madagascar, etc.

7. PSILOTRICHUM, Blume.

Herbs or undershrubs, 3-chotomously branched. *Leaves* opposite, petiolate, entire. *Flowers* white or greenish, hermaphrodite, in axillary solitary or paniced spikes or clusters; bracts small, chaffy; bracteoles 2, small. *Perianth*-segments 5, slightly connate below, ovate, acuminate, ribbed. *Stamens* 5; filaments unequal, slender, connate below in a thin cup; anthers 2-celled; staminodes 0. *Ovary* oblong or subglobose; style slender; stigma capitellate or 2-fid; ovule 1, pendulous from a long basal funicle. *Fruit* a globose or compressed utricle, enclosed in the hardened perianth. *Seed* inverse, lenticular; testa coriaceous or crustaceous; embryo annular, enclosing the floury albumen; cotyledons thin, flat; radicle ascending.—DISTRIB. Species 10—12, Asiatic, African or Pacific.

1. PSILOTRICHUM TRICHOTOMUM, Blume Bijdr. 545 (1826). A flaccid decumbent subglabrous annual herb 30—40 cm. high; branches erect, striate; nodes hairy. *Leaves* membranous; elliptic, elliptic-lanceolate or lanceolate, rarely obovate, acute at apex, narrowed at base, very pale when dry; 2—6 cm. long, 5—15 mm. broad; main nerves 2—3 pair, oblique, obscure; petiole very short or 0. *Spikes* green, terminal, 5—15 mm. long; flowers reddish, crowded; bract chaffy, persistent on the pubescent rachis; bracteoles minute, deciduous with the flower. *Perianth*-lobes equal, hard, lanceolate, acuminate, glabrous, 3—5-nerved, 2 mm. long, persistent around the fruit. *Stamens* very small; anthers suborbicular; filaments very thin. *Ovary* globose; style short; stigma capitate. *Utricle* membranous. *Seed* small; testa black, shining. Moq. in DC. Prodr. XIII. 1. 280; Hook. f. Fl. Br. Ind. IV. 725. *Achyranthes? carnosa*, Wall. Cat. 6931. *Leiospermum ferrugineum*, Wight Ic. t. 721. *Ptilotus trichotomus*, Miq. Fl. Ind. Bat. I. 1. 1037.

PERAK: in open ground on mountains at 250—300 m., *King's*

Collector 10732!—DISTRIB. India, Burma, Java, Sumatra (Lampor, 180 m. *Forbes* 2650 !), Borneo, Philippines.

AERUA, Forsk.

Herbs or undershrubs, more or less woolly. *Leaves* alternate or opposite. *Flowers* hermaphrodite or polygamous, in simple or paniced spikes; bract and 2 bracteoles small. *Perianth* 5-(rarely 4-) lobed, lobes equal or the outer broader, usually more or less woolly. *Stamens* 5, connate with short or long intervening staminodes in a short hypogynous cup; anthers 2-celled. *Ovary* ovoid or subglobose, 1-celled; ovule solitary, pendulous from a long basal funicle; style simple, short or long; stigma capitellate. *Fruit* a membranous utricle or circumsciss capsule with coriaceous crown. *Seed* inverse; testa coriaceous; *Embryo* annular, surrounding floury albumen; cotyledons linear; radicle inferior.—DISTRIB. Tropical Africa and Asia, species about 15.

1. AERUA CURTISII, Oliv. in Hook. Ic. Plant. t. 2201 (1892). A straggling undershrub or herb apparently perennial; branchlets pale, crispate-pubescent, grooved when dry. *Leaves* opposite, membranous; lanceolate, acuminate at apex, acuminate and long decurrent on the petiole at the base; upper surface puberulous at length glabrous, lower softly pubescent with whitish hairs, at length nearly glabrous; 6—12 cm. long, 2—5 cm. broad; midrib slender; main nerves 6 pairs, oblique; transverse nervules and reticulations obscure; petiole slender, 1—2 cm. long. *Flowers* in spikes, 2—4 cm. long in axillary subumbellate panicles or fascicles on a slender peduncle 1—3 cm. long; bract and 2 bracteoles ovate acuminate, 1 mm. long, the former persistent after the fall of the fruit with the bracteoles and perianth; rachis softly strigosely pubescent. *Perianth*-lobes ovate-oblong, acute, white, scarious, 5—7-nerved, 2—3 mm. long. *Stamens* small, the cup and staminodes hyaline, the filaments deltoid-subulate; anthers suborbicular. *Ovary* membranous, subglobose; style short; stigma capitate; ovule pendulous on a long funicle. *Utricle* membranous. *Seed* deeply and obliquely reniform, 2 mm. in diam.; testa black, minutely punctulate.

PERAK: bottom of Waterloo Estate, *Curtis* 2712! *Scortechini*! on rocks in Upper Perak, at 90 m. alt., *Wray* 3698!

This species has not much the appearance of a species of *Aerua*; it more nearly resembles a *Psilotrichum* as I at first believed it to be. The presence, however, of antherless filaments between the stamens requires it to be described in *Aerua*.

8. ACHYRANTHES, Linn.

Herbs, sometimes woody below. *Leaves* opposite, petiolate, entire. *Flowers* hermaphrodite, in slender simple and paniced spikes, soon deflexed; bracts membranous, spinescent, persistent on the rachis; bracteoles 2, spinescent. *Perianth* segments 5, lanceolate, aristate, rigid, somewhat connate below, ultimately ribbed and hardened. *Stamens* 2—5; filaments filiform, connate at the membranous base and alternating with as many square staminodes which are toothed lacerate or with a toothed scale at the back; anthers 2-celled. *Ovary* oblong, subcompressed, 1-celled; ovule solitary, pendulous from a long basal funicle; style filiform; stigma capitellate. *Fruit* an oblong or ovoid utricle, apex rounded or areolate. *Seed* inverse, oblong; testa coriaceous, tegmen membranous; embryo annular, surrounding the floury albumen; cotyledons oblong-lanceolate, incurved again; radicle erect.—DISTRIB. About 15 species, tropical and subtropical.

1. ACHYRANTHES ASPERA, Linn. Sp. Pl. 204 (1753). An erect undershrub reaching 30—90 cm. in height; stem stout and woody at base, the nodes swollen; branches few, terete or obscurely quadrangular, pubescent, striate. *Leaves* extremely variable, thick, elliptic or obovate sometimes nearly orbicular, rounded or subacute at apex, narrowed at base; both surfaces softly pubescent; 3·5—6 cm. long, 2·5—4 cm. broad; main nerves 3—4 pair, obscure; petiole 6—8 mm. long. *Flowers* greenish-white, numerous, stiffly deflexed against the woolly rachis, in elongate terminal lengthening spikes, often 50 cm. long in fruit; bracts ovate, aristate, membranous, persistent, 3—4 mm. long; bracteoles broadly ovate with a hard spine as long as or slightly longer than the blade, deciduous with the perianth, 3—5 mm. long. *Perianth*-lobes lanceolate, aristate, subequal, with narrow membranous margins, 3—6 mm. long. *Stamens* 5; filaments filiform; staminodes fimbriate; anthers oblong, scarcely 1 mm. long. *Utricle* oblong-cylindric, membranous, enclosed in the hardened perianth, 2—3 mm. long. *Seed* brown; cotyledons long, inflexed. Moq. in DC. Prodr. XIII. 2. 314; Roxb. Fl. Ind. I. 672 and Ed. Carey and Wall. II. 496; Dalz. and Gibs. Bomb. Fl. 218; Wight Ic. t. 1777; Trimen Fl. Ceyl. III. 404; Wall. Cat. 6924 excl. H; Miq. Fl. Ind. Bat. I. 1. 1042; Hook. f. Fl. Br. Ind. IV. 731; Cooke Bomb. Fl. II. 495; Prain Beng. Plants 875; Baill. Hist. des Pl. IX. 153. tt. 221—223. 'Cadelari' Rheede Hort. Mal. 155, t. 78.

SINGAPORE: Ridley 10632!—DISTRIB. India, Ceylon and all tropical regions.

9. ALTERNANTHERA, Forsk.

Herbs, usually prostrate, at any rate at base. *Leaves* opposite. *Flowers* hermaphrodite, small, white, in axillary often clustered heads; bract and 2 bracteoles scarious. *Perianth* segments 5, unequal, the 2 lateral innermost, concave. *Stamens* 2—5; filaments short, connate in a short cup, with or without intervening staminodes; anthers 1-celled. *Ovary* orbicular or ovoid; style short; stigma capitellate; ovule solitary, pendulous from a long basal funicle. *Fruit* a compressed ovoid orbicular or obcordate utricle, the margins usually thickened or winged. *Seed* inverse, lenticular; testa coriaceous or crustaceous; embryo annular, surrounding the floury albumen; cotyledons narrow; radicle superior.—DISTRIB. Species about 16, tropical and subtropical.

1. ALTERNANTHERA SESSILIS, Br. Prodr. Flor. Nov.-Holl. 417 (1810). A prostrate herb, or the lower part of the stem prostrate and rooting, the upper erect; branches many, glabrous below, the uppermost with 2 opposite lines of soft hairs. *Leaves* somewhat fleshy linear-oblong, lanceolate, oblanceolate or elliptic, obtuse or subacute at apex, narrowed at base; both surfaces glabrous; margins entire or obscurely denticulate; 1—5 cm. long, 1—2 cm. broad; main nerves 5—7 pairs, obscure; petiole very short or 0. *Flowers* sessile, white, shining, in small axillary sessile heads; bract and bracteoles ovate, acuminate, scarious, 1—1.5 mm. long. *Perianth*-segments 5, nearly equal, ovate, acuminate, scarious, 1-nerved, 2—3 mm. long. *Stamens* 2—3, very short; staminodes usually 0. *Ovary* obcordate, compressed, broader than long; style very short. *Utricle* obcordate, compressed, about 2 mm. long by 3 mm. broad, margins prominently thickened. *Seed* 1—1.5 mm. in diam., suborbicular; testa coriaceous, dark brown. Moq. in DC. Prodr. XIII. 2. 357; Dalz. and Gibs. Bomb. Fl. 220; Wight Ic. t. 727; Wall. Cat. 6921; Miq. Fl. Ind. Bat. I. 1. 1048; Hook. f. Fl. Br. Ind. IV. 731; Prain Beng. Plants 875. *A. triandra*, Lam. Encyc. Method. I. 95; Trimen Fl. Ceyl. III. 405; Cooke Bomb. Fl. II. 499. *A. denticulata*, Wall. Cat. 6922. *A. prostrata*, Don Prodr. Fl. Nep. 86; Moq. l. c. 360 for the most part. *Gomphrena sessilis*, Linn. Sp. Pl. 225. *Achyranthes triandra*, Roxb. Fl. Ind. I. 678 and Ed. Carey and Wall. II. 505. "Coluppa" Rheede Hort. Mal. X. 21. t. 11.

PENANG: Curtis 1043!; Deschamps! PERAK: Scortechini! SELANGOR: Goodenough! PAHANG: Ridley 1214! SINGAPORE: Kunsthler 143! Deschamps!—DISTRIB. All warm countries.

Family XCV.—POLYGONACEÆ.

By A. T. Gage.

Herbs or shrubs. *Leaves* usually alternate and entire, sometimes serrulate. *Stipules* usually membranous and forming a tube encircling the stem. *Inflorescence* axillary, racemose, spicate, capitate or paniculate. *Flowers* usually bi-sexual, pedicellate; perianth-segments 3—6, usually 5, free or more or less connate, imbricate in the bud, persistent. *Stamens* usually 5—8, perigynous. *Disc* annular, glandular or absent. *Ovary* free, biconvex or 3—4-angled. *Styles* 1—3; stigmas various, usually capitellate. *Ovule* 1, orthotropous; nutlet hard, usually included in the perianth. *Seed* erect, with membranous testa and horny or floury albumen. *Embryo* usually lateral, radicle superior.—DISTRIB. Species over 600, distributed all over the world, but with a preponderance of species in temperate regions.

1. POLYGONUM, Linn.

Herbs or shrubs. *Leaves* alternate, entire, usually petioled, stipules forming a membranous tube (ocrea) surrounding the stem. *Inflorescence*—in the Malayan Peninsular species—a branched spiciform raceme or a capitulate panicle. *Flowers* small, pink or white, pedicellate in the axils of small membranous spathe-like bracts. *Perianth*-segments usually 5. *Stamens* 5—8, perigynous, usually with minute yellow glands between the bases of the filaments; anthers usually pink or purple. *Ovary* lenticular or trigonous. *Styles* 2—3; stigmas capitellate. *Nut* included in the perianth, biconvex or trigonous, brown or black, usually polished.

Inflorescence of branched spiciform racemes:—

Ovary and nutlet bi-convex:—

Stem stout, over 6 dm.; leaves large, 23 cm. long, 4·5

cm. broad, very tomentose 1. *P. tomentosum*.

Stem slender, less than 3 dm.; leaves small, 6·5 cm.

long, 6 mm. broad, glabrous or minutely strigose .. 2. *P. minus*.

Ovary and nutlet trigonous:—

Perianth eglandular 3. *P. barbatum*.

Perianth glandular:—

Raceme very long, slender, decurved and long-interrupted

4. *P. flaccidum*.

Raceme rather short, scarcely decurved and short-interrupted

5. *P. Hydropiper*.

Inflorescence of capitulate panicles:—

An unarmed shrub 6. *P. chinense*.

Plants usually with recurved prickles on stem and leaves, sometimes only one or two at the base of the stipules:—

Nutlet trigonous	..	..	..	7. <i>P. strigosum</i> .
Nutlet biconvex	..	..	..	8. <i>P. pedunculare</i> .

It is curious that *P. plebejum*, although so widely spread throughout the tropics, appears to be as conspicuously absent from the Malayan Peninsula as from Ceylon.

1. *POLYGONUM TOMENTOSUM*, Willd. in Sp. Pl. II. 447 (1799). Root-stock prostrate, annual. *Stems* 6—12 dm., stout, erect, unbranched, with well developed internodes, grooved and glabrous or slightly pubescent where exposed. *Leaves* light green when fresh, very shortly petioled lanceolate, finely acuminate both at apex and base, strigosely or silkily hairy on both surfaces, 14—28 cm. long and 2.5—4.5 cm. broad; petiole 6 mm. long; veins numerous, 20—30, often obscure. *Stipular-tube* well developed, membranous, almost or entirely concealing the internode and impressed by its grooves and furrows, sparsely or thickly strigosely hairy; mouth truncate, beset with stiff cilia. *Inflorescence* of branched spiciform racemes; peduncles stout, strigose; racemes 5—10 cm., erect; bracts crowded, tubular, strigose and ciliate. *Flowers* 4—6 in the axil of each bract; pedicels about 3 mm. long, articulated below the perianth, and surrounded at the base by a delicate hyaline membranous bracteole. *Perianth* eglandular, about 4 mm. in diameter, white; segments 5, subequal, strongly veined. *Stamens* 5—8, alternating with minute glands at the base of the filaments which are nearly as long as the perianth segments; anthers large. *Ovary* lenticular. *Style* short, bifid above; stigmas capitate. *Nut* large, biconvex or orbicular, black polished, closely invested by the perianth. Roxb. Hort. Beng. 29 and Fl. Ind. II. 287; Miq. Fl. Ind. Bat. I. i. 1006; Hook. f. Fl. Br. Ind. V. 30; Wall. Cat. 1709 C and D. *Polygonum ocreatum*, Houtt. Pfl. Syst. VI. 442. t. 49, f. 1. *Polygonum pulchrum*, Blume Bijdr. 530.

PERAK: *Kunstler* 393!; *Wray* 2034!; at Ipoh, *Curtis* 3178!; *Deschamps*!.—DISTRIB. Africa, India, Burma, Andamans, Siam, Malayan Archipelago, Philippines.

2. *POLYGONUM MINUS*, Huds.; Meissn. in DC. Prodr. XIV. 1. 111 (1856). *Stem* creeping or ascending or erect, 15—30 cm. faintly grooved, glabrous. *Leaves* sessile, linear or lanceolate, acute, glabrous or minutely strigose, especially on the midrib and nerves beneath, 2—5.7 cm. long and about 6 mm. broad; nerves few or none apparen

Stipular-tube much shorter than the internodes, sparsely adpressedly strigose, truncate; mouth beset with stiff cilia considerably shorter than the tube. *Inflorescence* of branched spiciform racemes; peduncles slender, glabrous; racemes 1.3—2.5 cm., erect; bracts tubular, glabrous, stoutly ciliate. *Flowers* minute, 5 or more in the axil of each bract, on pedicels as long as or longer than the perianth segments. *Perianth* eglandular, segments 5, subequal. *Stamens* 5—8, very small. *Style* bifid above; stigmas capitellate. *Nut* minute, lenticular, black polished, included in the perianth. Boiss. Fl. Orient. IV. 1029; Miq. Fl. Ind. Bat. I. i. 1002; Hook. f. Fl. Br. Ind. V. 36; *Polygonum Posumbu*, Wall. Cat. 1722. *Polygonum tenellum*, Bl. Bijdr. 530. *Polygonum hypostictum* Miq. in Herb. Hohen. 971. *Polygonum strictum*, Allioni, Wight Ic. t. 1800.

PERAK: *Kunstler* 810!. PAHANG: *Ridley* 1616!.—DISTRIB. Europe, Temperate and Tropical Asia, Australia. Introduced into America.

3. *Polygonum BARBATUM*, Linn.; Meissn. in DC. Prodr. XIV. 1. 104 (1856). Branches stout, erect, glabrous, slightly grooved, 3—12 dm. *Leaves* very shortly petioled, lanceolate or linear-lanceolate, acuminate at both apex and base, glabrous or sparsely strigose or strigose only on the margins or midrib beneath, 9.5—15 cm. long, 1.3—2.5 cm. broad. *Stipular-tube* much shorter than the internodes, membranous, glabrous or with adpressed strigose hairs; mouth truncate, with stiff cilia longer or shorter than the tube. *Inflorescence* of branched spiciform racemes; peduncles slender, glabrous or more or less strigose. *Racemes* about 5.7 cm. long; bracts crowded, tubular, glabrous, stiffly ciliate. *Flowers* 4 or more in the axil of each bract; pedicels as long as or longer than the perianth segments. *Perianth* white, eglandular, very small; segments 5, subequal. *Stamens* 5—8, unequal, alternating with minute basal glands. *Ovary* trigonous. *Style* trifid above, stigmas capitellate. *Nutlet* trigonous, blackish brown, polished, included in the perianth. Bab. in Trans. Linn. Soc. XVIII. 100; Wall. Cat. 1708; Wight Ic. t. 1798; Miq. Fl. Ind. Bat. I. i. 999. Hook. f. Fl. Br. Ind. V. 37. *Polygonum hispidum*, Ham. *Polygonum rivulare*, Koen.; Roxb. Fl. Ind. III. 290; Grah. Cat. Bomb. Pl. 172. *Polygonum Hornemanni*, Meissn. in DC. l. c. 107.

JOHOR: *Ridley* 11024!. MALACCA: *Griffith*!. PENANG: *Curtis* 2785!. PERAK: at Ipoh, *Curtis* 3179!. SELANGOR: *Goodenough* 10461!. SINGAPORE: *Hullett* 10!; *Goodenough* 1604!; *Ridley* 3756!, 10729!.—DISTRIB. Tropical Asia and Africa, and Australia.

4. *POLYGONUM FLACCIDUM*, Meissn. in DC. Prodr. XIV. 1. 107 (1856). Stem erect or ascending, 6—9 dm., simple or branched, glabrous or more or less strigose, grooved and often glandular. *Leaves* shortly petioled, lanceolate or elliptic-lanceolate, acuminate, many nerved, glabrous or hispid or strigose on the midrib, margin, and nerves on both surfaces, glandular, 6.3—15 cm. long and 1.5—3.8 cm. broad. *Stipular-tube* much shorter than the internode, adpressedly strigose, often glandular; mouth truncate, beset with long stout cilia. *Inflorescence* of long filiform branched decurved spiciform racemes; peduncles glabrous, often glandular; racemes 5—16 cm. long; bracts distant, tubular, glabrous, often glandular, shortly ciliate. *Flowers* 3 or more in the axil of each bract, on pedicels as long as or longer than the perianth segments. *Perianth* segments 5, pink, subequal, thickly glandular. *Stamens* 7—8, subequal. *Ovary* trigonous. *Style* trifid almost to the base; stigmas capitellate. *Nutlet* small, trigonous, black, granulate. Boiss. Fl. Orient. IV. 1029; Hook. f. Fl. Brit. Ind. V. 39. *Polygonum tenellum*, Roxb. Fl. Ind. II. 289. *Polygonum mite*?, Wall. Cat. 1721, 1721-1. *Polygonum Rotleri*, Roth Nov. Pl. Sp. 205.

PERAK: *King's Collector* 809!, 2503!; *Ridley* 2964!. PAHANG: *Ridley* 1335!.—DISTRIB. India and Malayan Archipelago.

5. *POLYGONUM HYDROPIPER*, Linn. Sp. Pl. 361 (1753). An annual herb with stout erect or ascending stem; branches obscurely grooved, glabrous and often glandular. *Leaves* subsessile or very shortly petioled, lanceolate or oblong lanceolate, glabrous or with midrib nerves and margin more or less scabrid, often glandular, 5—9 cm. long and 1—2 cm. broad. *Stipular-tube* much shorter than the internode, membranous, glabrous or sparingly strigose, mouth truncate, shortly ciliate. *Inflorescence* of terminal and axillary, simple or branched, slender flexuous spiciform racemes; bracts more or less irregularly distant, tubular, glabrous, glandular or eglandular, shortly ciliate or eciliate. *Flowers* 2 or more in the axil of each bract, on pedicels as long as the perianth segments. *Perianth* pink, segments 5, thickly glandular, 2 outer narrower than the three inner. *Stamens* 5—8; anthers minute. *Ovary* trigonous; style trifid above; stigmas capitellate. *Nutlet* trigonous, black, granulate. Meissn. in DC. Prodr. XIV. 1. 109; Boiss. Fl. Orient. IV. 1029; Fl. Dan. t. 1576. *Polygonum Donii*, Wight Ic. t. 1801.

NEGRI SEMBILAN: *Ridley* 10024! PAHANG: *Ridley* 2254!.—DISTRIB. Cosmopolitan.

6. *POLYGONUM CHINENSE*, Linn. Sp. Pl. 363 (1753). A small shrub reaching a height of 1.5 m.; stem and branches glabrous or slightly pubescent, sometimes glandular, grooved. *Leaves* with a short petiole 6—12 mm. often auriculate and slightly winged above; lamina oblong-ovate or deltoid-ovate, acute, base truncate, rounded or acute, of upper leaves often cordate or amplexicaul, glandular or not, usually glabrous, sometimes sparsely hispidly-hairy especially on the midribs and nerves beneath; margins crenulate or entire; nerves from 5 or 6 to 20 or more, prominent beneath. Length of lamina 2.5—16 cm., breadth 2—8 cm. *Inflorescence* of axillary and terminal corymbose or paniculately branched leafily-bracteate cymes bearing the flowers in few or many capitulate clusters; peduncles glandular or hispidulous, especially near the flower heads; capitula 6—8 mm. in diameter; bracts of the flower-clusters glabrous or hispidly-hairy, eciliate. *Perianth* segments 5, white or pink, subequal, eglandular. *Stamens* 7—8, in two whorls alternating with small basal glands. *Ovary* trigonous; style trifid above; stigmas capitate. *Nutlet* trigonous, granulate, variable in size. Meissn. in DC. Prodr. XIV. 1. 130; Monog. 60; in Wall. Pl. As. Rar. III. 60; Bab. in Trans. Linn. Soc. XVIII. 109; Roxb. Fl. Ind. II, 289; Wight Ic. t. 1806; Grah. Cat. Bomb. Pl. 172; Dalz. and Gibs. Bomb. Fl. 214; Hook. f. Fl. Brit. Ind. V. 44. *Polygonum cymosum*, Roxb. l. c. *Polygonum auriculatum*, Meissn. Monog. 39, t. 6; Wall. Cat. 1705 A. and L. *Polygonum polycephalum*, Wall. Cat. 1707. *Polygonum brachiatum*, Poir. Dict. IV. 15; Wall. Cat. 1706. *Polygonum patens*, Don Prodr. 73; Meissn. Monog. 60. *Polygonum corymbosum*, Willd. Sp. Pl. II. 452. *Polygonum ovatum*, Heyne in Roth. Nov. Sp. 206. *Polygonum adenotrichum*, Wall. Cat. 1705 E. *Ampelygonum chinense*, Lindl. in Bot. Regist. 1838. *Coccoloba crispata*, Ham. in Roxb. Fl. Ind. II. 292. *Coccoloba indica*, Wall. Cat. 1705 H.

PERAK: *Scortechini*!; *Kunstler* 7968!.—DISTRIB. India, Ceylon, Burma, Malayan Archipelago, Philippines, China and Japan.

7. *POLYGONUM STRIGOSUM*, R. Br. Prodr. Fl. Nov. Holl. 420, (1810). *Stem* stout, 6—12 dm., erect or ascending, grooved and more or less covered with recurved prickles. *Leaves* shortly petioled, linear-oblong, acute, base truncate or shallow-cordate, glabrous or pubescent beneath, nerves numerous; petiole 6—12 mm. long; lamina 2.5—7.5 cm. long and 6—18 mm. broad. Petiole, margin and midrib beneath beset with retrorse prickles. *Stipular-tube* much shorter than the internode and encircled with a ring of recurved prickles

at the base, membranous, glabrous or adpressedly strigose, mouth shortly ciliate. *Inflorescence* of corymbose or paniculate cymes bearing about 3—6 obpyramidal or shortly oblong capitula; peduncles thickly glandular-hairy; bracts glandular-hairy and ciliate. *Flowers* rather large, on pedicels as long as the perianth segments. *Perianth* tubular; lobes 5, shallow. *Stamens* 5, minute. *Ovary* flat; style bifid above; stigmas capitellate. *Nutlet* bi-convex. Meissn. in DC. Prodr. XIV. i. 134; Hook. f. Fl. Br. Ind. V. 47. *Polygonum horridum*, Roxb. Fl. Ind. II, 291; Meissn. in Wall. Pl. As. Rar. III. 58, and in DC. Prodr. XIV. i. 133; Wall. Cat. 1697 B and D. *Polygonum muricatum*, Wall. Cat. 1697. *Polygonum sagittatum*, Don Prodr. 73.

PENANG: Wallich 1697 D in Herb. Calcutt.!.—DISTRIB. India, Burma, Ceylon, Malayan Archipelago, China.

8. POLYGONUM PEDUNCULARE, Wall. Cat. 1718 (1828). *Stem* somewhat slender, erect, 3—6 dm., grooved, glabrous or with a few scattered retrorse prickles. *Leaves* shortly petioled, lanceolate or oblong acute, base acute, often unequal or truncate or shallow-cordate, many nerved, glabrous or minutely scaberulous on the margin and midrib beneath; petiole 6—12 mm. long; lamina 2.5—6.3 cm. long and 6—25 mm. broad. *Stipular-tube* considerably shorter than the internode, glabrous or minutely prickly or with a few retrorse prickles surrounding the base, mouth eciliate. *Inflorescence* of paniculately divaricate slender branches, bearing a few globose or shortly oblong heads; peduncles slender, glabrous or sparsely hispid; bracts glabrous, eciliate or very shortly and sparingly ciliate. *Flowers* very shortly pedicelled; perianth segments 5, subequal. *Stamens* 5. *Ovary* lenticular; style bifid above; stigmas capitellate. *Nutlet* biconvex or globose, polished. Meissn. in DC. Prodr. XIV. 1. 133 in part; Miq. Fl. Ind. Bat. I., i. 1011. Hook. f. Fl. Br. Ind. V. 48. *Polygonum glabratum*, Wall. Cat. 6285.

JOHORE: Ridley 4220! and 11027!. MALACCA: Griffith!; Stoliczka!. PAHANG: Ridley 1616!. PENANG: Deschamps!. PERAK: Wray, 1890!, 2030!; Kunstler 2498!; Ridley 2965!. SELANGOR(?): Ridley 8175!. SINGAPORE: Wallich 1718!.—DISTRIB. India, Ceylon, Malayan Archipelago, Australia, Philippines, China.

Family XCVII.—ARISTOLOCHIACEÆ.

Herbs or shrubs, often climbing, usually with more or less unpleasant odour. *Leaves* alternate, petiolate, entire or lobed; stipules 0.

Flowers hermaphrodite, often large, usually lurid; terminal, axillary or lateral; solitary, racemose or cymose; bracts various, often wanting. *Perianth* simple, more or less adnate to the top of the ovary, regular or irregular, 3-lobed or tubular and variously shaped, the lobes valvate. *Stamens* 6 or more, adnate in 1 or 2 series to the style-column; cells parallel, extrorse, opening longitudinally. *Ovary* 4—6-celled; placentas parietal, free or meeting in the axis; ovules numerous, anatropous; style columnar ending in stigmatic lobes. *Fruit* capsular or baccate. *Seeds* numerous, horizontal or pendulous; albumen fleshy, copious, embryo minute.—**DISTRIB.** Species about 200, chiefly tropical.

Perianth regular; ovary 4-celled; capsule elongate

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| Stamens uniseriate | 1. APAMA. |
| Stamens biseriate | 2. THOTTEA. |

Perianth irregular, usually tubular with an inflated base and

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| expanded limb; capsule not elongate | 3. ARISTOLOCHIA. |
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1. APAMA, Lamk.

Shrubs or undershrubs, with stellate hairs or glabrate. *Leaves* alternate, petiolate, 3—5-ribbed, nerves and reticulations prominent beneath; stipules 0. *Flowers* in axillary or terminal or sub-radical bracteate cymes. *Perianth* shortly campanulate, equally 3-lobed, valvate. *Stamens* 6 to 12, uniseriate, free or connate around the style; anthers extrorse; cells 2; connective thick. *Ovary* inferior, elongate, 4-celled; style short; stigmas 3 or more, free or spreading in a flattened disk; ovules numerous, uniseriate in vertical rows from the axis, pendulous. *Capsule* elongate, 4-gonous, the keeled valves dehiscing septicidally from the central placenta of cruciform section. *Seeds* very many, oblong, trigonous, sometimes winged, attached in the furrows of the placenta in a vertical row; testa rugose, with a crustaceous outer and a membranous inner integument; albumen fleshy; embryo minute.—**DISTRIB.** Species 4 or 5, India and Malaya, one species in China.

Style column expanded in a disk; perianth-tube spreading;
stamens more than 6, short, connate; leaf-ribs reaching
nearly to the apex of the ovate long acuminate leaf (Sect.

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| 1. BRAGANTIA) | 1. A. corymbosa. |
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Style column divided in 3 erect stigmas; perianth-tube
urceolate-campanulate; stamens 6, long, free; leaf-ribs
reaching scarcely to the middle of the ovate-orbicular,
acute leaf (Sect. 2. CYCLODISCUS)

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| ..2. A. tomentosa. |
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1. *APAMA CORYMBOSA*, Soler. in Engl. & Prantl Naturl. Pflanzenfam. III. i. 272 (1889). A spreading shrub reaching 2.5 to 3 m. in height; branchlets brown, terete, jointed at the nodes. *Leaves* distichous, chartaceo-coriaceous; ovate ovate-oblong or ovate-lanceolate, long cuspidate-acuminate at apex, rounded or cuneate at base, entire; upper surface smooth, shining, glabrous except on the ribs and nerves, lower glaucescent and finely stellate-puberulous; 8—16 cm. long, 4—7 cm. broad; ribs 5 from the base, the outer pair close to the margin, the inner pair extending nearly to the apex; main nerves from the midrib 1 to 3 pairs, all joined by very prominent transverse nervules and reticulations; petiole short, about 5 mm. long, twisted. *Cymes* corymbose, terminal and axillary in upper leaf-axils, 5—8 cm. long and about as broad, minutely grey-puberulous; bracts linear, subulate, up to 5 mm. long; branches spicate; buds depressed. *Perianth-tube* spreading; lobes cordate, acute, 2—3 mm. in diam., greenish-grey, thick, rough within. *Stamens* 8 to 10 or more; anther cells parallel, short, rather distant. *Stigmas* spreading in a disk. *Capsule* 25—35 cm. long, 5 mm. broad, smooth, acuminate, torulose; pericarp 4-keeled, keels puberulous. *Seeds* trigonous, oblong-lanceolate, winged on the margins and at the ends, 4—6 mm. long, prominently rugose. *Bragantia corymbosa*, Griff. in Trans. Linn. Soc. XIX. 335; Duchart. in DC. Prodr. XV. i. 429; Miq. Fl. Ind. Bat. I. i. 1068; Hook. f. Fl. Br. Ind. V. 73. *B. melastomæfolia*, Duchart. l.c. *Asiphonia piperiformis*, Griff. l.c. 333, t. 37, Notul. 344 and Ic. Pl. Asiat. t. 528; Ann. Sc. Nat. Sér. 3, VII. 338. *Strakæa melastomæfolia*, Presl Epim. Bot. 221.

PENANG and PROVINCE WELLESLEY: Maxwell's hill and Kubang Ulu Reserve, *Curtis* 2045!. PERAK: at Thaipeng and Ralan Tujor, *Wray* 650!, 1793!; Larút Peak and Goping, *King's Collector* 437!, 2875!. SELANGOR: Caves at Kwala Lumpur, *Ridley* 411!. PAHANG: Raub track, *Machado* 11552!. MALACCA: *Griffith* K. D. 4438!; *Maingay* K. D. 1320!; *Lobb*!; *Cuming* 2333!; Bukit Panchore, *Derry* 165!.—DISTRIB. Sumatra (*H. O. Forbes* 2965).

2. *APAMA TOMENTOSA*, Soler. in Engl. & Prantl Naturl. Pflanzenfam. III. i. 272 (1889). A small undershrub, creeping below and rooting, then ascending, reaching 25 to 35 cm. in height; branchlets grey, hispid, furrowed, angular, geniculate and jointed at the nodes. *Leaves* 2 to 3 at the ends of the branchlets, chartaceo-coriaceous; ovate or orbicular-ovate, acute at apex, rounded or cordate at base, entire; upper surface smooth, shining, glabrous, lower white-hispid or villous; 12 to 20 cm. long, 8 to 12 cm. broad; ribs 3 to 7 from the base, the

outer 1—2 pairs close to the margin and faint, the inner pair stout, reaching to about the middle of the leaf; main nerves from the midrib 6—7 pairs, arching upwards, joined prominent by irregular transverse nervules and reticulation; petiole 5 to 10 mm. long, densely hispid. *Cymes* racemose from near the base of the stem, 5 to 10 cm. long, densely grey-hispid; bracts many, persistent, linear or linear-oblong, up to 1 cm. long; buds obovate, depressed at top. *Perianth* dull claret-coloured, yellow at centre; tube urceolate-campanulate below for 5 mm., annulate within, then spreading and divided to below the middle in 3 ovate cordate lobes 5 to 10 mm. in diam., lobes rough within. *Stamens* 6, free above, filaments joined below; anthers 2-celled, linear, surmounted by the acute produced connective. *Style*-arms 3, erect, ending in rounded hispid stigmas produced beyond the stamens. *Capsule* 7 to 9 cm. long, 4 mm. broad, linear, long acuminate, smooth, torulose; pericarp 4-keeled, the bosses of the seeds prominent when dry. *Seeds* trigonous, oblong, not winged, 4 mm. long, prominently rugose. *Bragantia tomentosa*, Blume Enum. Pl. Jav. 82; Duchart. in DC. Prodr. XV. i. 431; Benn. in Horsf. Pl. Jav. Rar. 43, t. 11; Griff. in Trans. Linn. Soc. XIX. 335; Miq. Fl. Ind. Bat. I. i. 1068; Hook. f. Fl. Br. Ind. V. 73. *B. khasiana*, Griff. l.c. *B. latifolia*, Lindl. in Bot. Reg. under t. 1543. *Bragantia* n. sp. Br. in Trans. Linn. Soc. XIII. 219. *Ceranium tomentosum*, Bl. Bijdr. 1135. *Cyclodiscus tomentosus* and *latifolius*, Klotzsch in Monatsb. Berl. Akad. 1859, 592. *Aristoloch.*, Wall. Cat. 9108.

PENANG: Waterfall, Tanjong Tirie and Paya Trobong, *Curtis* 1681!, 2754!. PERAK: *Wray* 3471!. PAHANG: at Kwala Tembeling, *Ridley* 2256!.—DISTRIB. India (Sylhet and Cachar), Burma, Java, Sumatra (Lampongs, *H. O. Forbes* 1672!).

VAR. *lanuginosa*, Hook. f. Leaves densely white-woolly beneath.

KEDAH: Lankawi Island, *Curtis* 1681!. At Kwala, *Yapp* 69!.—DISTRIB. South Andaman Island (*Kurz*).

2. THOTTEA, Rottb.

Shrubs, erect or straggling. *Leaves* alternate, shortly petioled, 3—7-ribbed, nerves and reticulations prominent; stipules 0. *Flowers* usually large, in short axillary cymes. *Perianth* broadly campanulate or urceolate, equally 3-lobed, lobes valvate. *Stamens* biseriate, numerous, with short filaments, inserted round the style-column; anthers extrorse; cells 2, rather distant; connective thick. *Ovary* inferior, elongate, 4-celled; style short, thick, arms 5—20, radiating,

sometimes forked, ending in the stigmas; ovules numerous, 2-seriate in vertical rows from the axis, pendulous. *Capsule* elongate, 4-gonous, septicidally 4-valved; placenta free, central, cruciform in section. *Seeds* oblong, trigonous; testa rugose; albumen fleshy; embryo minute. **DISTRIB.** Species 5, of the Malay Peninsula and Archipelago.

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| Perianth funnel shaped, widely open, 6—12 cm. long;
leaves hispid-pubescent beneath; stigmatic rays
8—15; stamens about 15 in each series.. | 1. <i>T. grandiflora.</i> |
| Perianth urceolate in tube, the lobes spreading,
about 15 cm. long; leaves glabrous beneath;
stigmatic rays 6; stamens about 16 in outer, 10 in
inner series | 2. <i>T. dependens.</i> |
| Perianth urceolate, nearly closed, less than 1 cm. long;
leaves hoary-puberulous beneath; stigmatic rays 4—
6; stamens about 12 in outer, 6 in inner series .. | 3. <i>T. tricornis.</i> |

1. *THOTTEA GRANDIFLORA*, Rottb. in Nye Dansk. Vidensk. Selsk. Skrift. II. 530, t. 2 (1783). An erect shrub, reaching 1—2 m. in height; branches stout, woody, villous with spreading hairs, striate, enlarged and jointed at the nodes. *Leaves* coriaceous, distichous; ovate, ovate-oblong or obovate, acute or shortly cuspidate-acuminate at apex, cordate at base; entire, upper surface sparsely villous when young, glabrous when old except on the midrib, lower surface ferruginously hispid-pubescent; 20—30 cm. long, 10—20 cm. broad; midrib conspicuously raised on both surfaces; ribs from the base 2—3 pairs, rather slender, the inner pair scarcely reaching half-way up; main nerves like the ribs 10 to 12 pairs, raised, slightly curved to the margin, joined by prominent more or less parallel transverse nervules and netted reticulation; petiole stout, ferruginous-villous, 5 to 10 mm. long. *Cymes* simple or branched, spicate, from lower nodes, 3—5 cm. long; bracts conspicuous, leafy, lanceolate, densely tawny villous, 1—3 cm. long. *Perianth* large, funnel-shaped, not constricted, membranous, 6—12 cm. long and as broad at mouth, prominently 9-nerved, and reticulate; deep claret-colour with yellow nerves and spots, villous without, cleft in 3 lobes about $\frac{1}{3}$ — $\frac{1}{2}$ down. *Stamens* in two series 15 or more in each; filaments short; anthers short, about 1 mm. long. *Ovary* densely villous below; column of styles thick, glabrous, spreading in 8—15 linear or forked stigmatic rays. *Capsule* 10—15 cm. long, straight or twisted, acute at the angle, pubescent. *Seeds* trigonous, 3—4 mm. long, acute at both ends, tubercled. Griff. in Trans. Linn. Soc. XIX. 325, t. 36; in Notul. IV. 346 and in Ic. Pl. Asiat. t. 530, 531; Ann. Nat. Hist. Ser. 3, VII. 328; Benn. Pl. Jav. Rar. i. 45;

Klotzsch in Monatsb. Berl. Akad. (1859) 589; Duchart. in DC. Prodr. XV. i. 428; Miq. Fl. Ind. Bat. I. 1. 1068; Hook. f. Fl. Br. Ind. V. 74; Ridley in Journ. Str. Br. R. As. Soc. (1900) 127.

PERAK: dense jungle near Ulu Kerling, 150—250 m. alt., *King's Collector* 8770!. MALACCA: *Griffith* K. D. 4439!; *Maingay* K. D. 1318!; at Belimbing, *Hervey*!; *Hullett* 204!; at Bukit Benang, *Curtis* 3662!. SINGAPORE: *Oxley*!; *Lobb* 594!; *T. Anderson* 192!; *Kurz*!; at Selitar and Bukit Mandai, *Ridley* 178!, 4691!. Vern. "Seburut" (*Ridley*).

2. *THOTTEA DEPENDENS*, Klotzsch in Monatsb. Berl. Akad. 589 (1859). A shrub, reaching 1—2.5 m. in height; branches stout, fistular, glabrous, enlarged, jointed and geniculate at the nodes; internodes terete. *Leaves* distichous, chartaceous; obovate or obovate-lanceolate, cuspidate-acuminate at apex, cuneate at base, entire; glabrous on both surfaces; 15—25 cm. long, 6—12 cm. broad; 5-ribbed from the base, the lower pair slender, short, close to the margin, the upper at first along the midrib and then straight towards the margin ending about half way up, the midrib stout, conspicuous; main nerves from the midrib like the ribs but more widely curved to and along the margin, 8 to 9 pairs, joined by prominent transverse nervules and these again by reticulations; petiole stout, 5—10 mm. long. *Cymes* simple or branched, spicate, often drooping, from near the base of the stems, 5—7 cm. long, minutely puberulous; bracts conspicuous, leafy, lanceolate; rhachis flexuose; buds depressed, triangular. *Perianth* pale yellow with centre and margin streaked with claret-colour; urceolate below for about 1 cm. in height, then erecto-patent and divided into 3 broad cordate acute lobes about 15 mm. long and 25 mm. broad, each 7-nerved and reticulate, glabrous. *Stamens* in two series, the outer ring of about 16, the inner of about 10; filaments slender, 4—5 mm. long; anthers linear, curved, 4 mm. long. *Ovary* elongate, slender, puberulous; column of styles thick, glabrous, spreading in 6 slender stigmatic rays, 3—4 mm. long. *Capsule* slender, 5—10 cm. long, torulose, keeled, constricted between the seeds when dry. *Seeds* trigonous, 3—4 mm. long, acute at both ends, tubercled. Duchart. in DC. Prodr. XV. i. 428; Hook. f. Fl. Br. Ind. V. 74. *Lobbia dependens*, Planch. in Hook. Lond. Journ. Bot. VI. 144, t. 3; Miq. Fl. Ind. Bat. I. i. 1068. *Piper arborescens*, Roxb. ex Wall. Cat. 6648 B.

PENANG: at Waterfall, etc., *Curtis* 1170!, 1507!; at 250—300 m. in dense jungle, *King's Collector* 1661!. PERAK: at Tapa, *Wray* 1318!, 3151!; at Lumut Dinding, *Ridley* 10346!. SINGAPORE: *Wallich* 6648 B.; *Lobb* 289!

3. *THOTTEA TRICORNIS*, Maingay ex Hook. f. in Fl. Br. Ind. V. 74 (1886). A shrub, reaching 1—2 m. in height; branches stout, pale brown, puberulous, swollen and jointed at the nodes, internodes channelled. *Leaves* coriaceous-chartaceous, distichous; elliptic-oblong or -obovate, or -oblanceolate, acute or acuminate at apex, attenuate and rounded at base, entire; upper surface glabrous, lower hoary-pubescent; 20—30 cm. long, 7—13 cm. broad; 5-ribbed from the base, the midrib stout, prominent, the inner pair slender reaching to about two-thirds up and then looped, the outer pair close to the margin, small, looped; main nerves from the midrib 6—8 pairs, curved upwards and joined by many prominent curved transverse nervules and a conspicuous reticulation, all ribs and nerves much raised beneath; petiole stout, twisted, 6—10 mm. long. *Cymes* paniculate, 3—5 cm. long, densely tawny-puberulous; bracts linear or lanceolate, small, lower ones leafy; buds depressed globose, 8 mm. in diam., the top with 3 raised points. *Perianth* urceolate, only slightly open at the mouth in 3 short lobes, grey and red, leathery. *Stamens* in 2 rows, the outer with 12—14, the inner with 6—8; filaments about 1 mm. long; anthers as long, curved. *Ovary* slender, tawny-puberulous; style column thick below, dividing above in 4 to 6 subulate stigmatic arms 1.5 mm. long. *Cap-sule* 15 to 20 cm. long, quadrangular, tawny-pubescent, 4—5 mm. in diam., not torulose. *Seeds* oblong-trigonus, shortly tubercled, 4—5 mm. long; 2 mm. thick.

PERAK: *Scortechini*, 1952 etc.!; at Goping, *Kunstler* (King's Collector) 705!. MALACCA: *Maingay*, K. D. 1319!.

3. *ARISTOLOCHIA*, Linn.

Shrubs or perennial herbs, prostrate or climbing; rhizome often tuberous. *Leaves* alternate, generally petioled, entire or lobed, often with a stipule-like leaf of an undeveloped bud in the axil, otherwise exstipular. *Flowers* solitary or fasciculate or in the leaf-axils, bracts at the bases of the flowers often rather large. *Perianth* very variable in shape, size and colour; usually the tube inflated below, then contracted in a cylindrical neck, then again expanded in a 2-lipped oblique limb, tube usually villous within. *Stamens* 6 (rarely less or more) adnate to and around the style-column with which the filaments and connectives are merged; cells 2, distinct, extrorse. *Ovary* inferior, 6-celled (rarely less or more); placentas parietal or intruded or connivent and connate in the axis; ovules very many, 1—2-seriate, anatropous, in vertical rows; style column thick, divided

above the anthers in a 3—6-lobed stigmatiferous disk. *Capsule* septically 6-valved or splitting through the placentas. *Seeds* numerous, horizontal, often attached to a part of the placenta which comes away with them, more or less flattened; albumen fleshy; embryo minute, close to the hilum, the radicle outwards.—*DISTRIB.* About 180 species, chiefly tropical.

Leaves ovate, acuminate, deeply cordate

Perianth 4—6 cm. long, upper lip of mouth very short or none; capsule 3—4 cm. long, papery; seeds flat, winged, without an adherent placenta 1. *A. Tagala*.

Perianth 1.5 cm. long, upper lip very short, rounded or bifid; capsule thick, rugose, 2.5 cm. long; seeds concave, not winged, rugose, with an attached boat-shaped placenta 2. *A. minutiflora*.

Leaves hastate or prominently and deeply 3-lobed; perianth with upper lip about 3 mm. long 3. *A. Curtisii*.

A. unguifolia, Masters in Journ. Linn. Soc. XIV. 494 (1875); Bot. Mag. t. 7424 is a handsome species of Borneo cultivated in the Singapore Bot. Garden. In Journ. Str. Br. R. As. Soc. (1900) 126, Mr. Ridley includes "*A. unguiflora*, Mast." as "local in long wet grass" at Singapore. His specimen from Jurong is in the Kew Herbarium, but in the doubt whether it is not merely a garden escape, I prefer not to include it among wild Peninsular species. It is also found in Sumatra.

1. ARISTOLOCHIA TAGALA, Cham. in Linnæa VII. 207 (1832).

An extensively climbing shrub, reaching the tops of trees; branchlets glabrous, grooved, twisted. *Leaves* membranous, glabrous, entire; ovate or ovate-oblong, acute or acuminate at apex, deeply cordate at base with the rounded auricles somewhat convergent; 10—20 cm. long, 5—10 cm. broad; pedately 5—7-ribbed at base, the midrib stout, the inner pair of ribs reaching to above the middle of the blade, the outer pairs spreading or deflexed; main nerves from the midrib 3—5, all joined by a lax reticulation; petiole 3—5 cm. long, often flattened, prehensile. *Flowers* in lax, axillary, puberulous racemes 2—6 cm. long, usually 1 only fertile; bracts small, oblong or ovate, often leafy, up to 1 cm. long. *Perianth* 4—6 cm. long; pale green, the lip marked with claret-brown; the base globose, then curved and slender cylindric for about 1 cm., then expanded in an oblique 2-lipped funnel, the upper lip very short or almost none, the lower produced in a linear apiculate lobe 2—3 cm. long, the funnel and lip and the inside of the globose base villous. *Stamens* 6, in a ring adnate to the column; anther-cells rather distant. *Style-column* surmounted by

an undulate fold; stigmatic lobes conical, beaked, connivent at tip. *Capsule* globose-pyriform or oblong, chartaceous, 3—4 cm. long, transversely linear-rugose between the ribs, 6-celled, the pedicels splitting into 6 segments in fruit. *Seeds* very many, horizontal, flattened, variable in shape but usually obtusely triangular and about 1 cm. in diam., with fragile wings and membranous testa, keeled on one side and tubercular on the other; albumen horny, flat, cordate in shape; embryo very minute, the cotyledons rather shorter than the radicle. Klotzsch in Monatsb. Berl. Akad. 597; Duchart. in DC. Prodr. XV. i. 480; Prain Beng. Plants 591; Cooke Bomb. Fl. II. 524. *A. Roxburghiana*, Klotzsch l.c. 596; Duchart. l.c.; Hook. f. Fl. Br. Ind. V. 75. *A. acuminata*, Roxb. Fl. Ind. III. 489 (not of Lamk.); Wall. Cat. 2705; Wight Ic. t. 771; Miq. Fl. Ind. Bat. I. i. 1066; Dalz. and Gibs. Bomb. Fl. 224.

PENANG: Wallich 2705!; Curtis 2464!; Deschamps! PERAK: Wray 1439!, 2295!, 3247; King's Collector 2745!, 5000!, 8359!, 10552!, 10577!. SELANGOR: Ridley 7613!. PAHANG: Ridley 2255!. MALACCA: Maingay K. D. 1321!.—DISTRIB. India, Ceylon, Burma, Siam, Java, Sumatra (Forbes 2921!), Philippines.

2. *ARISTOLOCHIA MINUTIFLORA*, Ridley ex Gamble in Kew Bull. 79 (1910). A slender climbing shrub; branches dark brown, corky-barked, sulcate, much twisted; branchlets very wiry, angular. *Leaves* membranous, glabrous, entire; ovate or ovate-lanceolate, acuminate at apex, deeply cordate at base, the auricles rounded somewhat converging inwards, the sinus 1.5 cm. deep and about as much broad; 5—15 cm. long, 3—7 cm. broad, the broadest near the base; pedately 5—7-ribbed at base, the midrib prominent, the inner pair of ribs also prominent and reaching nearly (quite, with loops!) to the apex, the outer pairs very slender, horizontal or deflexed; main nerves 2—3 from the midrib, reticulations faint; petiole slender, twisted, 3—5 cm. long. *Flowers* in lax axillary few-flowered slender puberulous racemes about 1 cm. long; bracts ovate acuminate, sheathing, 3 mm. long, puberulous. *Perianth* in all 1.5 cm. long, red and light grey (Kunstler), the base globose, 3 mm. in diam., followed by a curved tube 3 mm. long, then expanded in a 2-lipped funnel, the upper lip very short, rounded or 2-cleft, the lower produced in a linear twisted lobe 9 mm. long, the whole puberulous. *Stamens* 6, minute, connivent in a ring, the cells obtuse. *Ovary* puberulous, 6-furrowed; style slender, surmounted by a very short column ending in a peltate 6-lobed disk, the lobes conical-apiculate. *Capsule* obovate, 2.5 cm. long, 6-ribbed,

transversely marked by the prominent edges of the seeds. *Seeds* many, pyriform, concave, nearly 1 cm. long, attached to a crustaceous boat-shaped placenta; testa granular-rugose; albumen conform to the seed, fleshy; embryo very minute. Ridley M.S. in Herb. Calc.

PERAK: at Lumut, in dense jungle, *Ridley* 8022!; at Simpiti Dindings, *Ridley* 10259!; at Larut in very moist places, *King's Collector* (*Kunstler*) 1964!.

VAR. *dolabrata*, Gamble. *Perianth* with the upper lip produced for about 3 mm. and broadened, the lower 1 cm. long; in bud the lips closed up and with the tube having the form of an oblique pickaxe. *Leaves* as in type, always broadest near the base opposite the insertion of the petiole, above that sometimes a little indented. *Flowers* 'french grey, throat dark claret-brown' (Wray); 'lower part dark blue, middle greyish-white, top lighter blue; fruit yellowish-red when ripe' (*Kunstler*).

PERAK: Maxwell's Hill, *Wray* 2997!; Larut, 900—1100 m., *King's Collector* 2969!.

There are very few flowers available for examination and no fruit. The stamens and column are identical with those of *A. minutiflora* and the leaves are almost exactly the same. The perianth differs, however, and when better material is available, it may prove to be a good species.

3. *ARISTOLOCHIA CURTISII*, King ex Gamble in Kew Bull. 78 (1910). A rather small climbing shrub; branches with corky bark; branchlets wiry, sulcate, twisted, glabrous. *Leaves* chartaceous; younger ones broadly hastate; older ones broad, deeply digitately 3-lobed, the middle lobe oblong lanceolate acuminate mucronate, the side lobes spatulate rounded incurved, base cuneate; both surfaces glabrous, margins entire; hastate young leaves about 10 cm. long by 16 cm. broad, the sinus 1—3 cm. deep, old leaves 10—20 cm. long, 10—30 cm. broad, the sinuses reaching to within 2—6 cm. of the base; nervation pedately flabellate, 3-ribbed at the base; the central rib the midrib of the middle lobe; the outer ribs at first on the margin of the cuneate base, then giving off two interior ribs which form the outer ribs of the middle lobe close to its edges, next giving off one after the other two ribs for the outer lobes and finally itself forming a slender intramarginal rib to the same; the ribs of the outer lobes with few arcuate anastomosing nerves, the whole connected by transverse nervules and a netted reticulation; petiole slender, curved, channelled, 5—10 cm. long. *Flowers* in 1—3, axillary, prominently bracteate, racemes about 5 cm. long; rhachis zigzag; bracts amplexicaul, reddish,

ovate-acuminate, 1—1.5 cm. long; flowers 'velvety dark blue and pink' (*Kunstler*). *Perianth* puberulous, oblong and inflated at base, 1—5 cm. long, narrowed into a short tube 5 mm. long and then expanded in 2 lips; the upper short rounded, 3 mm. long; the lower acuminate, 2—2.5 cm. long. *Stamens* 6, sessile, inserted around the style-column; anther-cells 2, very distinct. *Style-column* short, expanded in a 6-lobed stigmatic disk with short conical tips. *Capsule* oblong, obtuse, 4 cm. long, 6-ribbed, the ribs winged when young. King M.S. in Herb. Calc.

PENANG: Government Hill, *Curtis* 330!; at Waterfall, *G. King*! at 150 m. in dense forest, *King's Collector* (*Kunstler*) 1453!

Family XCIX.—CHLORANTHACEÆ.

Herbs, shrubs or trees, usually aromatic. *Leaves* opposite, usually toothed, the petioles often connate in a sheath; stipules small, subulate, usually on the margin of the sheath. *Flowers* in terminal or pseudo-axillary spikes, heads or panicles; unisexual or the male and female cohering and hermaphrodite supported by a bract; ♂ flowers without perianth, ♀ with a 3-toothed limb adnate to the ovary. *Stamens* 1 or 3, connate; filaments very short and thick; anthers 2-celled, or, if 3 stamens, the side ones 1-celled. *Ovary* 1-celled; style very short; ovule 1, orthotropous, pendulous from the top of the cavity. *Fruit* a small, ovoid or globose, drupe; exocarp fleshy; endocarp crustaceous. *Seed* pendulous; testa membranous; albumen copious, fleshy; embryo minute; cotyledons divaricate or scarcely distinct; radicle inferior.—*Distrib.* Genera 3, tropical and subtropical; but not African.

1. CHLORANTHUS, Swartz.

Perennial herbs or shrubs, the stems articulate at the nodes. *Flowers* in terminal simple or paniced spikes; hermaphrodite, the ♂ and ♀ connate on a bract at the base; perianth 0. *Stamens* 1 or 3 confluent; if 3, the central anther 2-celled, the side ones 1-celled. *Ovary* naked; stigma sessile, truncate.—*DISTRIB.* About 10 species, Eastern Asiatic.

Stamens 3, connate by their connectives; leaves finely serrate. 1. *C. officinalis*.

Stamen 1, 4-celled on a broad connective; leaves coarsely

serrate

..

..

..

.. 2. *C. brachystachys*.

1. CHLORANTHUS OFFICINALIS, Blume Enum. Pl. Jav. 79 (1827).

A small erect glabrous undershrub reaching 1—2 m. in height.

Leaves variable in shape and size, usually elliptic or elliptic-lanceolate or elliptic-oblong, acuminate at apex, also usually at base; margin, finely glandular serrate; 7—25 cm. long, 2.5—10 cm. broad; main nerves about 10 pairs, curving upwards and joined by rather prominent but wide reticulations; petiole 0—1 cm. long, each pair joined in a sheath bearing minute subulate stipules. *Inflorescence* 5—13 cm. long; spikes 2.5 to 5 cm. long, slender; bracts sheathing, ovate, acute. *Stamens* 3 connate by their connectives, the middle anther 2-celled, the lateral 1-celled. *Berries* 5 to 6 mm. in diam., globose, white. Fl. Jav. III. 10. t. 1. Solms in DC. Prodr. XVI. i. 474; Miq. Fl. Ind. Bat. I. i. 801; Hook. f. Fl. Br. Ind. V. 100. *C. elatior*, Br. in Bot. Mag. t. 2190. *C. erectus*, Sweet; Wall. Cat. 6881. *Cryphea erecta*, Ham. in Brewst. Ed. Journ. (1825) 11, t. 2.

PENANG: *Wallich* 6881!. PERAK: *Curtis* 1180!, 1708!; forests near Larut at about 1000 m. alt., *King's Collector* 4235!. DINDINGS: *Ridley*!. MALACCA: *Griffith* 4396!; *Maingay* (K. D.) 1337!. SINGAPORE: *Hullett* 16!.—DISTRIB. N. India, Burma, China, Malay Archipelago, Philippines.

2. *CHLORANTHUS BRACHYSTACHYS*, Blume Fl. Jav. fasc. VIII. 13, 14, t. 2 (1828). A small erect glabrous undershrub reaching 1 m. high or more; branchlets terete. *Leaves* subcoriaceous; lanceolate or elliptic-lanceolate, long acuminate at apex, long attenuate at base; margins coarsely glandular-serrate; 10—20 cm. long, 3—7 cm. broad; main nerves 7—10 pairs, rather irregular; reticulations not prominent; petiole about 1 cm. long, each pair joined in a sheath bearing 2 small linear subulate stipules on either side. *Inflorescence* 3—8 cm. long; spikes 1—2 cm. long, rather dense; bracts small, acute. *Stamen* 1, short, depressed; anther-cells 4, connective broad. *Berries* 5—6 mm. in diam., globose, red. Wall. Cat. 6880; Solms in DC. Prodr. XVI. i. 475; Miq. Fl. Ind. Bat. I. i. 801, and Ann. Mus. Lugd.-Bat. III. 129; Benth. Fl. Hongk. 334; Hook. f. Fl. Br. Ind. V. 100. *C. monander*, Br. in Bot. Mag. t. 2190 in note. *C. ceylanicus*, Miq. l. c. 802. *C. denticulatus*, Cord. in Adans. iii. 296. *Ascarina serrata*, Blume Enum. Pl. Jav. I. 79. *Sarcandra chloranthoides*, Gardn. in Calc. Journ. Nat. Hist. VIII. 348; Wight Ic. t. 1946; Cord. l. c. 301.

PENANG: *Wallich* 6880!; Government Hill, *Maingay* (K. D.) 1338!; *Curtis* 1050!; *Deschamps*. PERAK: in Batang Padang Valley at about 1000 m. alt., *Wray* 1479!. PAHANG: *Ridley* 13710!.—DISTRIB. India (Khasia Hills, Nilgiris, Travancore), Ceylon, China, Malay Archipelago, Philippine Islands.

Family CII. LAURACEÆ.

Erect aromatic trees or shrubs, or (*Cassytha*) leafless twining parasites, usually evergreen. *Leaves* alternate, rarely opposite or sub-opposite, gland-dotted, rarely lobed, the margins entire; stipules 0. *Flowers* regular, small, hermaphrodite or dioecious, in axillary or lateral cymes, clusters, racemes or panicles; bracts 0 or deciduous, often involucriform. *Perianth* usually inferior; tube short, often enlarging in fruit; lobes usually 6, sometimes more, biseriate, imbricate or subvalvate, equal or unequal, one row sometimes wanting, deciduous or persistent in fruit, sometimes enlarged as are often the pedicels. *Stamens* usually a multiple of the perianth-lobes, in 2—4 series on the tube; filaments flattened, those of inner staminal rows usually, of outer sometimes, furnished with a pair of glands; anthers erect, 2—4-celled, the cells dehiscing by upcurved, at length deciduous, valvular lids, the 4th row of stamens often reduced to staminodes: in ♀ flowers the stamens replaced by staminodes, usually linear or clavate, some biglandular as in ♂. *Ovary* sessile at the base of the perianth-tube, 1-celled; ovule solitary, anatropous, pendulous from the top of the cell. *Fruit* a dry or fleshy berry or drupe, naked or rarely enclosed in the perianth-tube or often supported by the more or less enlarged perianth-tube and lobes, the pedicel frequently thickened. *Seed* pendulous; testa membranous; albumen 0; cotyledons plano-convex, fleshy; radicle minute, superior.—DISTRIB. About 900—1000 species in the warmer regions of the world.

Trees or shrubs

Stamens of 3rd row, when present, with extrorse anthers

Anthers 2-celled

Stamens of 3rd row present, those of 1st and

2nd row introrse, if present

Stamens of 1st and 2nd rows present, all

3 rows fertile

Fruit surrounded by the enlarged perianth (Tribe I. CRYPTOCARYÆ)

1. CRYPTOCARYA.

Fruit seated on the more or less enlarged perianth (Tribe II. APOLONIEÆ)

Perianth-segments equal, deciduous in fruit; fruiting pedicels little or not enlarged ..

2. BEILSCHMIEDIA.

Perianth-segments unequal, the outer 3 smaller, persistent in

- fruit ; fruiting pedicels much enlarged 3. *DEHAASIA*.
- Stamens of 1st and 2nd rows absent, of 3rd row sessile (Tribe III. *ACRODICTIDIAE*) 4. *ENDIANDRA*.
- Stamens of 3rd row absent, those of 1st and 2nd row extrorse (Tribe IV. *MICROPORAE*) .. 5. *MICROPORA*.
- Anthers 4-celled; fertile stamens 9 (Tribe V. *CINNAMOMEAE*)
- Leaves usually opposite or subopposite, rarely alternate, usually 3- or more ribbed ; fruiting perianth-tube enlarged into a cupule embracing the fruit .. 6. *CINNAMOMUM*.
- Leaves alternate
- Fruiting perianth-tube enlarged
- Fruiting pedicels enlarged, very thick, usually warted ; outer perianth-lobes equal to or slightly smaller than inner ; anthers ovate-oblong, fairly large ; glands large, glabrous like the inner side of the cordate staminodes 7. *ALSEODAPHNE*.
- Fruiting pedicels hardly enlarged ; perianth lobes unequal, the 3 outer smaller than the 3 inner ; anthers ovate-oblong, very small ; glands villous ; staminodes ovate, villous on both sides 8. *NOTHAPHOEBE*.
- Fruiting perianth-tube hardly enlarged
- Fruiting perianth-lobes reflexed .. 9. *MACHILUS*.
- Fruiting perianth-lobes erect, cup-like
- Fruiting pedicels short, not enlarged ; anthers ovate-oblong ; glands large, stipitate ; staminodes cordate, stipitate .. 10. *PHOEBE*.
- Fruiting pedicels long, clavate ; anthers triangular ; glands small or absent ; staminodes triangular, sessile .. 11. *STEMMATODAPHNE*.
- All stamens with introrse anthers, the lower cells sometimes lateral
- Anthers 4-celled (Tribe VI. *LITSEAE*).
- Fertile stamens 9 ; involucre bracts deciduous in flower ; leaves usually subverticillate, 3-ribbed or 1-ribbed, penninerved .. 12. *ACTINODAPHNE*.
- Fertile stamens normally 9 or 12, frequently more, rarely less ; involucre bracts persis-

- tent in flower; leaves alternate or sub-
 opposite, penninerved 13. *LITSEA*.
 Fertile stamens 6; involucre bracts early
 deciduous; leaves alternate or subverti-
 cillate, 3-ribbed.. .. 14. *NEOLITSEA*.
 Anthers 2-celled (Tribe VII. *LAUREÆ*)
 Fertile stamens usually 9 or 12; involucre
 bracts deciduous or not; leaves alternate
 or sub-opposite, penninerved or 3-ribbed.. 15. *LINDERA*.
 Leafless filiform twining parasites with suckers; stamens
 with 4-celled anthers, outer two rows introrse, inner
 row extrorse (Tribe VIII. *CASSYTHÆ*) .. 16. *CASSYTHA*.

Tribe I.—*CRYPTOCARYÆ*.

1. *CRYPTOCARYA*, R. Br.

Evergreen trees or shrubs. *Leaves* usually alternate, penninerved
 or 3-ribbed, more or less coriaceous. *Flowers* small, hermaphrodite,
 in axillary or subterminal pedunculate panicles. *Perianth*-tube tur-
 binate or ovoid, after flowering constricted at the top; lobes 6, sub-
 equal. Perfect *stamens* 9, those of the 1st row introrse, opposite the
 outer 3 lobes of the perianth; those of the 2nd row introrse, opposite
 the 3 inner lobes; within and alternate with the stamens 6 stipitate
 glands; slightly within these again the 3 extrorse stamens of the 3rd
 row opposite the stamens of the 1st row; again, slightly within these,
 3 stipitate cordate staminodes opposite the stamens of the 2nd row.
Ovary sessile at the bottom of the perianth-tube in which it is
 enclosed; style shortly exserted; stigma obtuse or capitate. *Fruit*
 wholly enclosed in the perianth-tube which is accrescent, drupaceous,
 hardened or fleshy, smooth or ribbed, the mouth occluded, the limb
 deciduous or more or less persistent; pericarp membranous or thinly
 crustaceous, more or less free from the perianth-tube. *Seed* with a
 membranous testa often not separable from the pericarp; cotyledons
 thick, fleshy; radicle minute.—*DISTRIB.* Species about 40, tropical
 and subtropical, in both hemispheres.

I have followed Benthams (*Fl. Austral.* V. 294) and Koorders and Valetton
 (*Bijdr.* X. 211) in describing the glands as free and alternate with the stamens
 of the 1st and 2nd row instead of being attached to those of the 3rd. If a fully
 open flower is examined it will be seen that the glands are inserted between
 the stamens of the 2nd and 3rd rows. If such a flower is flattened out care-
 fully and the staminodes and 3rd row stamens removed (they often come
 away together in a ring), the 6 outer stamens and the 6 glands alternate with

them will be easily apparent. The glands are slightly in front of the 6 outer stamens and slightly behind the 3 inner and the staminodes.

Leaves 3-ribbed (Sect. 1. CARYODAPHNE)

Leaves elliptic-ovate, coriaceous, over 7 cm. long, long-acuminate at apex, margins thin 1. *C. densiflora*.

Leaves orbicular-ovate, very coriaceous, under 7 cm. long, scarcely acute at apex, margins cartilaginous 2. *C. Wrayi*.

Leaves 1-ribbed, penninerved (Sect. 2. EUCRYPTOCARYA)

Leaves with the under surface conspicuously hairy and with net-venation prominent

Leaves usually large; panicles dense; flowers comparatively large

Leaves long-acuminate; bracts long, conspicuous; fruit ovoid-oblong 3. *C. Griffithiana*.

Leaves obtuse, emarginate or shortly acuminate; bracts small, inconspicuous; fruit ellipsoid 4. *C. crassinervia*.

Leaves moderate-sized, never over 15 cm. long and 7 cm. broad; panicles open; flowers small.

Leaves elliptic, obtuse or shortly acuminate; fruit spherical, about 1.5 cm. in diameter 5. *C. impressa*.

Leaves oblong or oblong-lanceolate, acuminate; fruit ovoid-flask-shaped about 2 to 2.5 cm. long, 1.5 cm. broad 6. *C. rugulosa*.

Leaves with the under surface slightly hairy, becoming glabrous when old; net-venation fairly prominent ..

Leaves with under surface glaucescent, minutely puberulous; terminal panicles about 15 cm. long; fruit ovoid or ellipsoid, faintly ribbed, 25 mm. long, 18 mm. broad 7. *C. tomentosa*.

Leaves with under surface reddish, puberulous only when young; terminal panicles about 20 cm. long; fruit ovoid-oblong, 30-35 mm. long, 15 mm. broad 8. *C. ferrea*.

Leaves with the under surface quite glabrous; net venation not much raised

Leaves prominently bluish-glaucous beneath; panicles blackish-tomentose; bracts and bracteoles prominent, linear, up to 1 cm. long 9. *C. bracteolata*.

Leaves merely bluish or greyish beneath; panicles rusty-tomentose; bracts and bracteoles not prominent, small

Leaves 5 to 8 cm. broad or broader, obtuse at apex Panicle elongate, 20-25 cm. long; transverse nervules of leaves prominent, distant 10. *C. Scortechinii*.

Panicles short, 10-15 cm. long; transverse nervules of leaves inconspicuous, very numerous and close 11. *C. areolata*.

Leaves scarcely 3-6 cm. broad, acuminate at apex.

Panicles narrow; bracts of flowers minute;

main nerves of leaves 7—12 pairs .. 12. *C. Kurzii*.

Panicles spreading; bracts of flowers linear.

3 mm. long; main nerves of leaves 6—8

pairs 13. *C. caesia*.

Species imperfectly known

(14. *C. enervis*.

15. *C. Bubon-*

gana.

(16. *C. argentea*.

1. CRYPTOCARYA DENSIFLORA, Blume Bijdr. 556 (1825). A tree reaching 20 m. in height and 40 to 50 cm. in diameter; trunk thick, cylindric; bark reddish, smooth; branchlets dark brown, terete, rather stout, the uppermost somewhat angled and tawny-puberulous; buds lanceolate, tawny-puberulous. *Leaves* coriaceous, yellowish when dry; elliptic or elliptic-ovate, abruptly long-acuminate at apex, the acumen obtuse, attenuate at base; upper surface glabrous, shining, lower glaucous and glabrous, pruinose when fresh; 8—15 cm. long, 4—7 cm. broad; 3-ribbed from the base or up to 1 cm. above it, all impressed above, the side ribs only little fainter than the midrib, and extending sometimes half-way up, sometimes nearly to the acumen, or joined by loops to the main nerves of which usually only 1 to 2 curving pairs; transverse nervules few, irregular; nervules outside the side ribs about 4—5 looped together; reticulations finely areolately-netted; petiole stout, 10—15 mm. long. *Flowers* in axillary or terminal corymbose tawny-pubescent panicles much shorter than the leaves, usually 2—3 cm. in length and breadth; cymules dichotomous; bracts ovate, acute, caducous; bracteoles lanceolate; pedicels 1—5 mm. long or less. *Perianth*-tube turbinate, 1.5 mm. long, constricted at the mouth; lobes 2—2.5 mm. long, ovate, obtuse, sparsely villous within. *Stamens* of 1st and 2nd rows 1.5—2 mm. long, the connective produced in a rounded tip; filaments pubescent; those of 3rd row similar but more slender; staminodes ovate acuminate, glabrous in front, villous behind, 1.5 mm. long, stalk .5 mm.; glands glabrous, rounded, stipitate, .75 mm. long. *Ovary* and style narrowly subulate; stigma capitate. *Fruit* depressed-globose with a conical tip, 1.5—2 cm. long and rather more in diameter, ribbed and bossed when dry. *Seed* conform to the pericarp; testan membranous; cotyledons plane on the inner, rugose and rounded on the outer sides. Koord. and Val. Bijdr. X. 213. *Caryodaphne densiflora*, Nees Syst. Laur. 228; Miq. Pl. Jungh. 117 and Fl. Ind. Bat. I. i. 927; Meissn. in DC. Prodr. XV. i. 76.

PERAK: in forest near Larút, *King's Collector* 3605!, 5480!, 10684!—DISTRIB. Java, from 650 to 1500 m. alt.; Borneo (*Haviland* 3333!).

2. *CRYPTOCARYA WRAYI*, Gamble in Kew Bull. 142 (1910). A small tree; branchlets nearly black, minutely puberulous, somewhat angular, lenticellate; buds ovate-acuminate, tawny-puberulous. *Leaves* thickly coriaceous; ovate or orbicular-ovate, shortly and very bluntly acute at apex, truncate at base; upper surface glabrous, shining, lower glaucous and minutely puberulous; 5—7 cm. long, 4—5 cm. broad; 3-ribbed from about 5 mm. above the base with sometimes a minute pair from the base close to the cartilaginous margins, the midrib stout, depressed above, prominent beneath, extending to the apex, the side ribs curved to $\frac{2}{3}$ ths or $\frac{3}{4}$ ths of the way and with 3—5 outside nerves; main nerves 2—3 pairs from the midrib, curving upwards to and along the margin; transverse nervules many, arched, indistinct; reticulations minute, areolate on the lower surface; petiole stout, grooved above, 5—10 mm. long. *Flowers* in terminal or axillary rusty-pubescent panicles of cymes up to 3 cm. long, longer in fruit; the rachis angular; pedicels very short scarcely 1—2 mm. long; buds clavate, 3 cm. long; bracts and bracteoles deciduous. *Perianth*-tube funnel-shaped, 1.5 mm. long; lobes as long as tube, orbicular, rusty-pubescent especially without, the throat of the tube rusty-villous. *Stamens* of 1st and 2nd rows with anthers triangular-ovate, the connective produced in an acute tip, 1.5 mm. long, villous on the rather stout filaments; those of 3rd row rather shorter, the tip more rounded; staminodes triangular acuminate, 1 mm. long, villous on the back, and shortly stipitate; glands glabrous, rounded, .5 mm. long with the short stalk. *Ovary* ovoid-cylindric, slightly villous, produced in a slender style and short capitate stigma. *Fruit* depressed-globose, glabrous, obscurely ribbed, with a short terminal cup of the bases of the perianth-lobes; 2 cm in diam., 1.5 cm. long. *Seed* conform to the fruit; testa membranous; cotyledons thick, the inner face nearly plane, outside rugose.

PERAK: at Gunong Bubu, Larút, 1500 m. alt., *Wray* 3853!

3. *CRYPTOCARYA GRIFFITHIANA*, Wight Ic. t 1830 (1852). A tree, reaching 15 to 25 metres in height and 25 to 75 cm. in diameter of stem; branchlets stout, densely rusty velvety-tomentose. *Leaves* coriaceous; oblong-lanceolate to oblong, long caudate-acuminate at apex, acute or cuneate, sometimes rounded at base; glabrous and

shining on the upper surface when mature except on the midrib which is rusty-tomentose, when young all rusty villous; lower surface glaucous and puberulous, between the densely rusty-tomentose midrib and prominent nervation; 20 to 30 cm. long, 5 to 10 cm. broad; midrib narrow above, broad and prominent below, densely tomentose; main nerves 8 to 12 pairs gracefully arching to and along the margin, deeply impressed above, prominently raised beneath, each pair joined almost horizontally by sub-parallel transverse nervules, also impressed above; petiole stout, 1 cm. long. *Flowers* subsessile, in dense crowded rusty-villous bracteate axillary and subterminal panicles up to 10 cm. long; bracts linear-lanceolate, usually 5 to 10 mm. long, one with two similar smaller bracteoles to each flower. *Perianth*-tube cylindric, slightly constricted at top, 2 mm. long, densely villous without; lobes ovate-oblong, 4 mm. long, densely rusty-villous. *Stamens* of 1st and 2nd row about 2 mm. long with villous filaments and ovate anthers, those of 3rd row rather longer, the connective produced at the top in an acute crest; staminodes of 4th row 1.5—2 mm. long, cordate, apiculate, glabrous in fruit, villous behind; glands shortly stipitate, 1 mm. long. *Ovary* narrowly ovoid, glabrous, glandular-dotted, attenuated into a slender style; stigma obtuse. *Fruit* when young ovoid-oblong, glabrous, obscurely ribbed, attenuated into a ring at top and the boss of the perianth-lobes, when old globose with a flask-shaped mouth 2 cm. long, 1 cm. in diam. *Seed* narrowly ovoid, attenuated into a beak; testa membranous, adherent to the persistent perianth tube; cotyledons thick, inside face plane; radicle conical. Kurz For. Fl. II. 295; Hook. f. Fl. Br. Ind. V. 117; Miq. Fl. Ind. Bat. I. i. 923; Brandis Ind. Trees 527. *C. infectoria*, Miq. var. *caudata*, Meissn. in DC. Prodr. XV. i. 68.

PERAK: at Ulu Bubong and Ulu Kerling, 100–200 m., *King's Collector* 8650!, 10173!, 10999!; hills at 250–300 m. alt., *King's Collector* 10794!; *Scortechini* 510!. SUNGAI UJONG: *Ridley* 2042! MALACCA: *Griffith* 4276!; *Maingay* (K. D.) 1249!; *Kurz*!; at Merliman, etc. *Holmberg* 860!, 890!; *Goodenough* 1568!. JOHORE: at Muar, Biawak, *Curtis* 3614!. SINGAPORE: at Changi, Selitar and Teban, *Ridley* 175!, 427!, 3382!.—DISTRIB. South Tenasserim.

4. *CRYPTOCARYA CRASSINERVIA*, Miq. Fl. Ind. Bat. I. i, 924 (1855). A tree, reaching a height of 20 to 25 m. and a diameter of stem of 35 to 60 cm.; branchlets stout, subtetragonously angled, densely rusty tomentose as are the inflorescences and the innovations, the hairs of the tomentum unequal. *Leaves* very coriaceous;

elliptic or obovate-oblong, or oblong-oblongeolate, sometimes almost orbicular; obtuse, emarginate, sometimes mucronate or shortly acuminate at apex, rounded or slightly attenuate at base; margin usually recurved; upper surface shining usually conspicuously bullate, glabrous when mature except on the midrib and nerves; lower surface greyish-rusty-pubescent between the densely rusty tomentose nervation; 10—30 cm. long, 5 to 15 cm. broad; midrib very stout, scarcely raised or impressed on the upper, much raised on the lower surface; main nerves 5 to 10, impressed above, raised beneath, curving upwards to and along the margin and joined by prominent also impressed transverse nervules, and these again by reticulations; petiole stout, 1.5 to 2.5 cm. long. *Flowers* sessile, in stout dense much branched axillary and terminal panicles up to 10 or 15 cm. long; bracts thick, oblong or spatulate, about 4 mm. long, with 2 bracteoles 1 to 2 mm. long to each flower. *Perianth*-tube cylindric, densely rusty-tomentose, 2—5 mm. long; lobes about 4 mm. long, ovate, 3-nerved, grey, the outer slightly acute, tufted hairy near the tip and somewhat longer than the obtuse inner ones. *Stamens* of 1st and 2nd row about 2.5 mm. long, the filaments villous, those of 3rd row as long and with the connective crest-like; staminodes of 4th row cordate acuminate, obtuse at apex, hirsute on the back, .2 mm. long; glands large, 1.5 mm. long, glabrous, villous-stipitate. *Ovary* slender, ending in a long style and obtuse stigma; the young fruit prominently urceolate at first. *Fruit* ellipsoid, black, glabrous and smooth when ripe, ribbed when young, 2 cm. long by 1.5 cm. in diam. *Seeds* conform to the enlarged perianth-tube; testa membranous; cotyledons fleshy. Meissn. in DC. Prodr. xv. i. 69. *C. infectoria*, Miq. var. *β. acuminulata*, Meissn. in DC. Prodr. XV. i, 68.

PERAK: *Scortechini* 217!; at Maxwell's Hill, 1000 m., *Wray* 2962!; about Larút, on low ground and up to 350 m. *King's Collector* 2823!, 4448!, 4670!, 5129!, 5347!, 6037!, 6579!, 6719!, 7935!, 8396!; at Bruas, *Burn-Murdoch*!—DISTRIB. Sumatra (at Fort de Kock, *Teysmann* Herb. Bog. 1007!), Borneo.

This species approaches rather nearly, as hinted by Meissner, to *C. Griffithiana*, but is distinguished by the usually very obtuse, short apiculate or even emarginate leaves, the ellipsoid fruit, the small bracts and the blunt staminodes. It is therefore considered best to maintain it separate, and the long series of specimens of either species with very little tendency to intermediate (*Wray* 2962 is the only one slightly so) seems to support the conclusion. *Burn-Murdoch* gives the Vernacular name "Medang miang."

5. CRYPTOCARYA IMPRESSA, Miq. Fl. Ind. Bat. I. i, 923 (1855). A.

large tree (Wray); branchlets rather stout, dark brown, the uppermost with the inflorescence and innovations densely finely rusty-tomentose. *Leaves* coriaceous; elliptic, shortly and sharply and abruptly acuminate at apex or sometimes obtuse, attenuate at base; dull and glabrous on the upper surface when mature except on the midrib which is raised and broad and rusty-tomentose, lower surface glaucous and puberulous between the densely rusty-tomentose midrib and prominent nervation; 7 to 15 cm. long, 3 to 7 cm. broad; main nerves 6 to 10 pairs, impressed above, much raised beneath, curved upwards to the margin and joined by subparallel transverse nervules, and these again joined by prominent reticulations; petiole very stout, 2 cm. long. *Flowers* subsessile, in spreading bracteate axillary panicles rarely longer than the leaves; bracts linear, about 2 mm. long, with 2 minute bracteoles. *Perianth*-tube turbinate, 1—5 mm. long, constricted at mouth; lobes ovate-oblong, about 2 mm. long, the inner 3 slightly smaller than the others. *Stamens* of 1st and 2nd row about 1 mm. long, the filaments villous; those of the 3rd row rather longer and with the connective produced in a broad crest; staminodes cordate, glabrous in front, villous behind; glands rounded, villous-stipitate. *Ovary* narrowly ovoid with a slight angle near the top, slightly villous; style slender; stigma briefly trifid; young fruit prominently urceolate and tomentose without. *Fruit* nearly spherical, blackish, puberulous, about 1.5 cm. in diam. Hook. f. Fl. Br. Ind. V. 117. *C. infectoria* Miq. var. γ . *opaca*, Meissn. in DC. Prodr. XV. i, 69.

PERAK: at Lower Camp, Gunong Batu Pateh, Wray 1126! MALACCA: Griffith! (K. D.) 4277!; Maingay (K. D.) 1250!. SINGAPORE: in garden jungle, Ridley 4821! or 4921!.—DISTRIB. Sumatra (at Paya Kombo, Teysmann!).

Wray's specimen has smaller leaves than usual, with more obtuse points at apex and less prominent nervation on the upper surface; but I see no reason to doubt it, for some even of Griffith's specimens come very near it.

6. *CRYPTOCARYA RUGULOSA*, Hook f. in Fl. Br. Ind. V. 118 (1886). A large tree, reaching 25 to 30 m. in height and a diameter of stem of 60 to 90 cm.; branchlets rather slender, firmly rusty pubescent. *Leaves* coriaceous; oblong or ovate-oblong or oblong-lanceolate, acute or acuminate at apex, cuneate at base; shining and glabrous above even on the nerves, finely rusty-pubescent beneath and greyish in the spaces between the nervules; 5—15 cm. long, 3—6 cm. broad; midrib stout, deeply impressed above, prominent beneath; main

nerves also impressed above and raised beneath, 5 to 10 pairs, curved upwards, and joined by subparallel transverse nervules also impressed above, and these again by a minute network of reticulations; petiole 1 cm. long, usually twisted. *Flowers* very small, pedicellate, in slender rusty pubescent much branched terminal or axillary leafy panicles about as long as the leaves; bracts at base of pedicel oblong, 1.5 mm. long, bracteoles 3 much shorter; pedicels .5 mm. long. *Perianth*-tube cylindrical, constricted at mouth, 1.5 to 2 mm. long; lobes ovate, obtuse, equal, as long as tube, nearly glabrous within. Stamens of 1st and 2nd row short, anthers ovate, filaments villous, connective glandular dotted; those of 3rd row obtuse, also dotted, and with rather large reflexed crest; staminodes of 4th row cordate acuminate, dotted, villous on the back, .75 mm. long; glands .5 mm. long, stipitate. *Ovary* narrowly ovate, attenuate into the style; stigma obtuse. *Fruit* black, glabrous, ovoid-flask-shaped, acute at apex, 2 to 2.5 cm. long, 1.5 cm. broad. *Seed* conforms to the fruit; testa membranous, dark brown; cotyledons very fleshy.

PENANG: at Muka Head, *Curtis* 958!. PERAK: Road to Bruas Dinding, *Ridley* 8359!; at Lumut Dinding, *Ridley* 10314!; dense forest about Larut at 150—300 m. alt., *King's Collector* 3749!, 5311!, 6279!. MALACCA: *Maingay* (K. C.) 1262!; *Hullett* 664!.

7. CRYPTO-CARYA TOMENTOSA, Blume Mus. Bot. Lugd.-Bat. I. i, 335 (1851). A tree reaching a height of 15 to 20 m. and a diam. of 25 to 35 cm.; branchlets brown, rather stout, somewhat angular with prominent rather large lenticels, uppermost and innovations tawny-puberulous. *Leaves* chartaceo-coriaceous; elliptic or oblong-lanceolate, sometimes subovate, shortly acuminate at apex, cuneate attenuate or occasionally rounded at base; upper surface glabrous except on the midrib and main nerves, dull or slightly shining, lower glaucescent, tawny villous on the midrib and nerves minutely puberulous between them, ultimately almost or quite glabrous; 10—20 cm. long, 4—8 cm. broad; midrib stout, slightly impressed above, prominent beneath; main nerves 8 to 15, slightly raised on the upper surface, curving upwards to and along the margin and there sometimes joining in loops, secondary nerves occasional, transverse nervules subparallel, slender, moderately conspicuous as are the reticulations between them; petiole 1 cm. long, puberulous. *Flowers* pedicellate, in axillary or terminal branching grey- or tawny-pubescent panicles shorter than the leaves and about 10 cm. long if axillary, if terminal reaching 15 cm. or more; cymes spreading, corymbose;

bracts and bracteoles minute, caducous; pedicels 1 mm. long. *Perianth*-tube funnel-shaped, 1.5 mm. long; lobes as long, interior of flower only very slightly sericeous, quite as in *C. ferrea* as are the stamens and ovary. *Fruit* ovoid or ellipsoid, black, smooth, ribbed when young, faintly so when old, 25 mm. long, 18 mm. broad, apex truncate, depressed, the base rounded. *Seed* conform to the fruit, 15 mm. long, 10 mm. broad, depressed at apex; testa chartaceous; cotyledons fleshy. Miq. Fl. Ind. Bat. I. i, 923; Meissn. in DC. Prodr. XV. i, 71; Koord. and Val. Bijdr. X. 218. *C. glaucescens*, Hassk. Cat. Bog. 89.

PERAK: at Batu Kuran, *Scortechini*!; near Kinta river and elsewhere up to 160 m., *King's Collector* 5744!, 7050!, 7818!, 8776!.—
DISTRIB. Java, Borneo.

var. *rugosa*, Gamble. Panicles with conspicuously rugose branches; leaves glabrous, petioles very thick, 1 to 1.5 cm. long.

MALACCA: at Sungei Hudang, *Derry* 1142! (*Ridley*).

This is a species of whose identification I have felt a little doubtful, the specimen sheets of true *C. tomentosa* at Kew and Calcutta being very few and consisting chiefly of rather young sprays. But I think, to judge from the Calcutta material, both from Java and Borneo, and from the descriptions, that I am right.

8. *CRYPTOCARYA FERREA*, Blume Bijdr. 557 (1825). A tree, reaching 15 to 20 m. in height and 25 to 35 cm. in diam.; branchlets stout, angular, rough and lenticellate, the ultimate ones and the inflorescence minutely rusty-pubescent. *Leaves* chartaceo-coriaceous; oblong or oblong-obovate, sometimes oblong-lanceolate, obtuse at tip with a short acumen, cuneate or alternate at base sometimes rounded; upper surface dull or slightly shining; glabrous, lower pale reddish or cinnamon-brown, puberulous only when young and on the nerves; 10—25 cm. long, 5—10 cm. broad; midrib stout, slightly impressed above, prominent beneath; main nerves 9 to 12, or sometimes 15 pairs, impressed slightly above, the lowest pair small and close to the margin, all gently curving to the margin and joined by prominent rather distant and irregular transverse nervules, which enclose a minutely netted reticulation; petiole 5—10 mm. long, rough, puberulous in young leaves. *Flowers* pedicelled, in axillary or terminal rusty-puberulous panicles, the axillary ones usually shorter than the leaves, the terminal reaching sometimes a length of 20 and breadth of 15 cm., branches spreading, cymes trichotomous; bracts and bracteoles small, ovate-lanceolate, caducous; pedicels about 1 mm.

long. *Perianth*-tube funnel-shaped, 1—5 mm. long; lobes ovate, equal or the inner slightly smaller, 2 mm. long, only slightly pubescent within. *Stamens* of 1st and 2nd series rounded at tip, filaments slightly sericeous, those of 3rd series usually acute at tip; glands subsessile, glabrous, alternate with the outer 6 stamens; staminodes of 4th row cordate acuminate very shortly villous-stipitate. *Ovary* slender, glabrous. *Fruit* ovoid-oblong, 3—3.5 cm. long, 1.5 cm. in diam., attenuate to the slightly truncate apiculate tip, black, smooth; pedicel clavate. Nees Syst. Laurin. 216; Miq. Fl. Ind. Bat. I. i, 921; Meissn. in DC. Prodr. XV. i, 69; Hook. f. Fl. Br. Ind. V. 119; Koord. and Val. Bijdr. X. 216. *C. oblongifolia*, Bl. l. c. 557; Nees l. c. 215. *C. obscura*, Bl. in Mus. Bot. Lugd.-Bat. I. 335. *C. Mentek*, Bl. in Nees l. c. 218.

PENANG: at Pulau Boetong Reserve, *Curtis* 2739!. PERAK: about Larút up to 350 m. *King's Collector* 3909!, 5974!, 6166!, 8562!, 8708!, 8818!, 10976!. MALACCA: at Sungei Udang, *Derry* 425!; at Bukit Sidwan, *Pun Bebas* 131!; at Sungei Udang, *Good-enough* 1358!. JOHORE: Pmerong, *Caniley* 8!. SINGAPORE: at Choa-chukang, *Ridley* 5996!, 8040!.—DISTRIB. Java.

Vern. 'Kayu Medang Kuning' (*Pun Bebas*); 'Medang Merah' (*Good-enough*). In reference to the doubt regarding the identification of this species given in the Fl. Br. Ind., I have compared the descriptions and available specimens of both the Peninsular and Archipelago species and believe it to be correct.

9. *CRYPTOCARYA BRACTEOLATA*, Gamble in Kew Bull. 143 (1910). A tree, reaching 18 to 24 m. in height and 40 to 50 cm. in diam.; branchlets terete, light brown, minutely grey-puberulous; innovations and upper branchlets, also the inflorescence, dark rusty-tomentose. *Leaves* coriaceous; ovate or elliptic, bluntly acuminate at apex, cuneate at base; upper surface dull or very slightly shining, glabrous except the midrib, lower surface bluish-glaucous, almost quite white when dry, the midrib and main nerves tawny-puberulous; 10—18 cm. long, 4—8 cm. broad; midrib rather slender, slightly impressed above; main nerves 6 to 8 pairs, the lowest from very near the base, curved upwards to and along the margin, joined by irregularly subparallel rather distant transverse nervules, and these again by the somewhat prominent reticulations; petiole 1—2 cm. long, twisted. *Flowers* in axillary or terminal long-bracteate blackish tomentose panicles much shorter than the leaves, the axillary ones rarely up to 5 cm. the terminal rather longer; bracts and bracteoles similar, linear, up to 1 cm.

long, the tip inrolled; pedicels 1—2 mm. long. *Perianth*-tube funnel-shaped, about 5 mm. long, thickened above; lobes oblong, rounded, 3—5 mm. long. *Stamens* of 1st and 2nd rows with rounded connective and villous filaments; those of 3rd row with connective acute; staminodes cordate-acuminate, penicillate at tip; glands rounded, prominently stalked. *Ovary* and style slender, glabrous; stigma capitate. *Fruit* black, glabrous, depressed-globose, 15 mm. long, 18 mm. in diam., tipped with a conspicuous apex. *Seed* conform with the fruit; testa membranous; cotyledons thick, hemi-spherical.

PERAK: in dense jungle near Larút, on hills from 150 to 450 m. alt., *King's Collector* 6732 !, 7521 !.

10. *CRYPTOCARYA SCORTECHINII*, Gamble in Kew Bull. 143 (1910). A tree reaching 18 to 24 m. in height and a diameter of stem of 40 to 50 cm., branchlets pale brown, angular, puberulous; innovations rusty pubescent. *Leaves* coriaceous; elliptic, elliptic-oblong or elliptic-lanceolate, obtuse or shortly acuminate sometimes long-acuminate at apex, attenuate at base; upper surface somewhat shining, glabrous, reticulate, lower purplish-grey or -glaucous also glabrous except sometimes for a slight pubescence on the midrib and main nerves; 10—20 cm. long, 5—10 cm. broad; midrib stout, slightly impressed above; main nerves 6 to 9 pairs, curving upwards to meet in loops near the margin and joined by a few irregular transverse nervules and a prominent reticulation, the nerves and reticulation slightly raised above; petiole stout, channelled above, 1—2 cm. long. *Flowers* shortly pedicelled, in axillary or terminal branched panicles reaching 20—25 cm. long, the branches nearly glabrous, the flowers minutely tawny-grey-pubescent; main peduncles about 6 cm. long; cymes spreading, ending in 2 pedicellate with 1 sessile flower; bracts and bracteoles ovate-lanceolate, acute, pubescent; pedicels 1 mm. long. *Perianth*-tube funnel-shaped, 1.5 mm. long; lobes ovate as long as tube, puberulous within. *Stamens* of 1st and 2nd series rounded at top, filaments villous; those of 3rd series narrower, broadly crested at top, filaments villous; staminodes of 4th row cordate acuminate, villous on the back; glands rounded, globose, shortly stipitate. *Ovary* lanceolate, globose, style slender. *Fruit* oblong-ellipsoid, truncate at tip, glabrous, 3 cm. long, 10—15 mm. in diam.; pericarp (enlarged perianth-tube) thick, rugose; pedicels much thickened, rusty-brown. *Seed* oblong, acute; testa membranous, cotyledons fleshy.

PERAK: at Thaiping, *Ridley* 2966!; at Gunong Haram, *Scortechinii*

568!, 619!; near Larút, up to 1500 m. alt., *King's Collector* 6281!, 6297!, 6298!, 6871!, 8686!, 10895!. SUNGEI UJONG: *Ridley* 5849 !.

In its leaves and inflorescence this species strongly resembles *C. Wightiana*, Thwaites, but in its fruit it is quite different; for that of *C. Wightiana* is globose and smooth and has not the very prominently enlarged pedicels. *Ridley's* 5849 has the perianth-tube longer than it is in the other specimens, but this is probably due to the flowers being on the verge of the fruiting stage.

11. *CRYPTOCARYA AREOLATA*, Gamble in Kew Bull. 144 (1910). A large tree, reaching 15 to 20 m. in height and 40 to 50 cm. in diam.; branchlets stout, angular, sparsely rusty puberulous and closely roughly lenticellate, innovations and inflorescence minutely rusty puberulous. *Leaves* coriaceous; ovate or elliptic ovate, the younger sometimes lanceolate, obtusely acute or rounded at apex, rarely acuminate, cuneate and often unequal at base; upper surface smooth, glabrous and somewhat shining, areolate-reticulate, lower glaucous, purplish when dry, glabrous except on the midrib and main nerves; 10 to 20 cm. long, 5 to 8 cm. broad; midrib moderately stout, flattened or somewhat keeled on the upper surface, prominent on the lower; main nerves 5 to 10 pairs, rather distant, the lowest pair close to the margin, all at first more or less straight and then curving to and along the margin, joined by many slender parallel transverse nervules scarcely more conspicuous than the elegantly areolate reticulations between them; petiole curved, 2 cm. long. *Flowers* subsessile, in axillary or terminal rusty-pubescent branching panicles of cymes, 10 to 15 cm. long; bracts and bracteoles ovate-lanceolate, early caducous. *Perianth*-tube cylindrical, 1.5 mm. long; lobes ovate, equal, 2.5 mm. long, pubescent within. *Stamens* of 1st and 2nd rows with villous filaments and broadly crested subacute connective 1—1.5 mm. long, those of 3rd row similar but longer and prominently crested; staminodes of 4th row sagittate, sharply acuminate, 1 mm. long, villous behind and at the base; glands large, rounded and glabrous, villous-stipitate. *Ovary* slender as is the style, slightly angled on one side near the top; stigma capitate. *Fruit* not known.

PERAK: at Sungie Larút, *Wray* 2456!; in open jungle on low-ground at 100—250 m., *King's Collector* 6017!, 6171!, 8630!.

12. *CRYPTOCARYA KURZII*, Hook. f. in Fl. Br. Ind. V. 119 (1886). A small tree reaching 10 to 12 m. in height and with stem 10 to 15 cm. in diameter; branchlets rather slender, terete, lenticellate, gla-

brous except the tawny-puberulous innovations. *Leaves* chartaceous; lanceolate or ovate-oblong or oblong-lanceolate, acuminate at apex, cuneate or acute or rounded at base; upper surface red-brown, shining or dull, glabrous except sometimes on the midrib, lower surface brown-glaucous or bluish-glaucous, sometimes minutely puberulous on the midrib and main nerves; 10—20 cm. long, 3—6 cm. broad; midrib fairly stout, slightly impressed above as are the 7 to 12 pairs of oblique main nerves which are joined by slender inconspicuous subparallel nervules and the minutely netted reticulation; petiole 1—1.5 cm. long, thickened, rugose, nearly glabrous. *Flowers* subsessile, in tawny-pubescent axillary or terminal panicles, the axillary curved and shorter than the leaves, the terminal usually somewhat elongate; bracts and bracteoles minute, caducous. *Perianth*-tube funnel-shaped, 1.5 mm. long; lobes ovate-acute or the inner rounded, sub-equal, sparsely golden-pubescent within, 2 mm. long. *Stamens* of 1st and 2nd rows 1.5 mm. long, connective produced in a membranous subacute tip, filaments villous; those of 3rd row similar but more slender; staminodes of 4th row cordate, acuminate, villous at back and on the short base, 1 mm. long; glands rounded, glabrous, .5 mm. long on villous stalks .25 mm. long. *Ovary* slender, glandular, glabrous; stigma capitate. *Fruit* urceolate when young, when old black, ovoid, acute, reaching about 1.5 cm. long and 1 cm. broad. *C. Wightiana*, *δ. Griffithii*, Meissn. in DC. Prodr. XV. 1. 70 (excl. the Canara plant). *C. ferrea*, Kurz For. Fl. II. 295 (not of Blume).

PERAK: at Thaipeng, Wray 2650; in dense jungle near Larut, King's Collector 3042!, 3901!, 5250!, 5320!, 5395!, 6083!, 6571!, 8469!. MALACCA: Derry 324!. SINGAPORE: Chanchukang, Ridley 3761!, 4134!, 5996!, 6158!.—DISTRIB. Tenasserim, Java, Borneo (Haviland 3082!, 3652!).

This species seems, by description, to be very near to *C. acutiflora*, Bl., but it does not agree with the only specimens of the latter that I have seen. I do not feel quite sure I am right in identifying the large available material as belonging to *C. Kurzii*, of which I have only seen two sheets at Kew (*Griffith* 4274 K.D. 1142); but I believe it is correct to do so. I have been a little in doubt about K.C. 6083 as to the possibility of its being the flowering form of *C. argentea*, but I think not.

13. CRYPTOCARYA CÆSIA, Blume Mus. Bot. Lugd.-Bat. I. 335 (1851). A tree; branchlets pale brown, slender, terete, softly tawny-velvety. *Leaves* chartaceous; ovate- or elliptic-oblong, long blunt acuminate at apex, attenuate, often unequally, at base; upper

surface dull, glabrous except on the midrib, lower surface glaucous or glaucescent, minutely puberulous when young, afterwards glabrous; 9—14 cm. long, 3—5 cm. broad; midrib moderately thick, impressed and keeled on the upper surface, prominent on the lower; main nerves 6—8 pairs, impressed above and slightly keeled, raised beneath, curved obliquely upwards to the margin and joined by rather indistinct irregular transverse nervules and a minutely netted reticulation; petiole 1 cm. long, moderately stout. *Flowers* in axillary or terminal tawny-pubescent panicles, the axillary shorter than the leaves, the terminal elongated; branches slender, cymes few-flowered; bracts linear, about 3 mm. long; bracteoles similar but smaller; pedicels none in central flowers, about 1 mm. long in lateral ones. *Perianth*-tube funnel-shaped, 1.5 mm. long; lobes as long, ovate, rounded at tip, slightly tawny-villous within. *Stamens* of 1st and 2nd rows with acute anther connectives and villous filaments; those of 3rd row similar and rather longer; staminodes cordate, acute, villous on the back; glands rounded, glabrous, the pedicel villous. *Ovary* and style slender, glabrous; stigma discoid. *Fruit* globose, smooth, 10—12 mm. in diam., pericarp fleshy. *Miq. Fl. Ind. Bat. I. 1. 925.*

MALACCA: at Sudang Reserve, *Derry* 1144!. SINGAPORE: Chanchukang and Bukit Mandai, *Ridley* 4820!, 6665!.—DISTRIB. Java, Andaman Islands.

Species imperfectly known.

14. *CRYPTOCARYA ENERVIS*, Hook. f. in *Fl. Br. Ind. V. 119* (1886). An evergreen tree (?); branchlets slender, black when dry, glabrous. *Leaves* thinly coriaceous; elliptic-lanceolate, caudate-acuminate at apex, acuminate at base; both surfaces glabrous, brownish green when dry, subglaucous and violet-brown beneath; 7—12 cm. long, 2—4 cm. broad; midrib slender, raised on the upper surface; main nerves 6—8 pairs, faint, curving upwards to and along the margin and there joining in diminishing slender loops; transverse nervules few, irregular, faint as are the reticulations; petiole slender, about 1 cm. long, bordered above by the decurrent margins of the blade. *Flowers* apparently in slender axillary panicles shorter than the leaves, the flowers themselves wanting. *Fruit* globose, smooth, 10—12 mm. in diam., faintly sulcate, tip short, obtuse.

MALACCA: Griffith K.D. 4336!

15. *CRYPTOCARYA BUBONGANA*, Gamble in *Kew Bull. 144* (1910). A large tree, reaching 15 to 20 m. in height and 60 cm. in diam. of

stem; branchlets stout, angular, dark brown, uppermost minutely puberulous. *Leaves* coriaceous; elliptic or elliptic-oblong, shortly acuminate at apex, attenuately rounded often unequally at base; glabrous on both surfaces, dull on the upper; 10—16 cm. long, 3—6 cm. broad; midrib very stout, slightly impressed and keeled on the upper surface, very prominent on the lower; main nerves 6 to 9 pairs, slightly impressed above, very prominent beneath, curved gradually upwards to and along the margin and joined by very slender close subparallel transverse nervules and minutely netted reticulation; petiole curved, slightly puberulous, 10 to 15 mm. long. *Panicles* lateral, few-flowered, stout, shorter than the leaves. *Flowers* not known. *Fruit* globose, glabrous, dark green, black when dry, 10—12 mm. in diameter.

PERAK: open mixed jungle on Ulu Bubong at 150 to 250 m. *King's Collector* 10570!

16. *CRYPTOCARYA ARGENTEA*, Gamble in Kew Bull. 144 (1910). An evergreen tree reaching 15 to 20 m. in height and 37 to 50 cm. in diam. of stem; branchlets slender, pale brown, lenticellate, the uppermost minutely puberulous. *Leaves* coriaceous, often bullate; oblong or oblong-lanceolate, shortly obtusely acuminate at apex, cuneate at base; upper surface bright green when fresh, brown when dry, shining, glabrous, lower silvery-grey when fresh, bluish-glaucous when dry, the nerves puberulous; 8—15 cm. long, 3—6 cm. broad; midrib rather slender, strongly impressed above; main nerves 8—10 pairs, slightly impressed above, curved to near the margin and then meeting in a small loop, joined by irregular transverse nervules and an obscure reticulation; petiole slender, 9—12 cm. long, black when dry. *Flowers* in axillary or terminal slender panicles reaching about 6 cm. in length; only young fruit (ellipsoid, faintly ribbed) known.

PERAK: in dense jungle at 90—180 m. alt., *King's Collector* 7966!

This species comes near to *C. Kurzii*, Hook. f.

Tribe II. APOLLONIEÆ.

2. BEILSCHMIEDIA, Nees.

Evergreen trees or shrubs. *Leaves* alternate or opposite, usually coriaceous, penni-nerved, venose-reticulate. *Flowers* usually small, hermaphrodite, axillary lateral or subterminal, racemose or paniced.

Perianth-tube short; lobes 6, subequal, deciduous after flowering. *Stamens* 9 perfect, with 2-celled anthers, those of the 1st and 2nd rows introrse; those of the 3rd extrorse; staminodes of the 4th row cordate or ovoid, often concave in front, shortly stipitate; glands 6, stipitate, nearly as large as the staminodes, between the 2nd and 3rd row of stamens and rather nearer the latter with which they often come away though not attached to the filaments. *Ovary* sessile, free from the perianth, attenuate into the style; stigma obtuse. *Fruit* an oblong ovoid or globose berry; pedicels not or only thickened below, little at the perianth-ring; perianth quite deciduous leaving a narrow ring; cotyledons fleshy with often a rudimentary dissepiment between them, sometimes ruminant.—DISTRIB. About 20 species, all tropical.

Leaves very coriaceous, brown when dry, 20—35 cm. long, 7—12 cm. broad; flowers in panicles over 10 cm. long.

Leaves oblong, perianth-lobes ovate, 1—5 mm. long; stamens short.

1. *B. insignis*.

Leaves obovate, perianth-lobes oblong, 4 mm. long; stamens rather long.

2. *B. Kunstleri*.

Leaves coriaceous, greenish above when dry, 10—20 cm. long, 3—10 cm. broad; flower panicles mostly under 10 cm. long.

Leaves alternate; flowers rather large; perianth-lobes 3 mm. long.

Leaves glabrous on the reddish brown under surface; perianth-tube flattened.

3. *B. malaccensis*.

Leaves villous on the purplish under surface; perianth-tube conical.

4. *B. Curtisi*.

Leaves subopposite, rusty-villous; flowers rather large, in panicles 12 cm. long; perianth-lobes 2.5 cm. long.

5. *B. Scortechinii*.

Leaves opposite; panicles subglabrous, very slender, up to 6 cm. long; flowers very small.

6. *B. lumutensis*.

Leaves thinly coriaceous or chartaceous, alternate or subopposite.

Flower-panicles dense, under 4 cm. long; perianth-lobes 3 mm. long; leaves reddish-brown when dry

7. *B. Maingayi*.

Flower-panicles spreading, 10—14 cm. long.

Leaves usually shining, greenish on upper surface when dry; main nerves regular, parallel; panicles grey.

8. *B. longipes*.

Leaves usually dull, reddish-brown on upper surface when dry; main nerves irregular; panicles reddish.

9. *B. perakensis*.

Flowers in very short bracteate racemes; perianth-lobes 1 mm. long; leaves reddish-brown when dry; branchlets white

10. *B. penangiana*.

Species imperfectly known.

Leaves membranous, elliptic or elliptic ovate; fruit up to 15 mm. long

11. *B. membranacea*.

Leaves chartaceous, lanceolate or oblong-lanceolate; fruit up to 25 mm. long

12. *B. pahangensis*.

Leaves coriaceous, lanceolate or oblong-lanceolate; fruit 35 mm. long

13. *B. Foziana*.

1. *BEILSCHIMIEDIA INSIGNIS*, Gamble in Kew Bull. 147 (1910). A medium-sized tree, reaching 15 to 20 m. in height and 45 to 60 cm. in diameter of stem; branchlets dark brown, stout, glabrous, lenticellate; buds slender up to 1 cm. long with glabrous lanceolate scales. *Leaves* very coriaceous, opposite or alternate; oblong or oblong-ob lanceolate, acute at apex, attenuate at base; both surfaces glabrous, shining, olive-brown when dry; 20—35 cm. long, 7—12 cm. broad; midrib stout, slightly impressed above, keeled beneath when dry; main nerves 10 to 15 pairs slightly impressed above and raised beneath, starting at 50° to 60° with the midrib and curving up to and along the margin where they end in gradually diminishing small loops between the angular transverse nervules, these and the net venation being raised and well marked on the under, less so on the upper surface; petiole stout, channelled above, 20—25 mm. long. *Flowers* in slender axillary panicles up to 12 cm. long; rhachis glabrous, flattened; branches slender with few- (2—3-) flowered cymules; pedicels slender, 2 mm. long. *Perianth*-tube cup-shaped, 1 mm. long; lobes ovate, obtuse, 1.5 mm. long, glabrous on both sides except a slight ring below the stamens. *Stamens* of 1st and 2nd rows 1.5 mm. long, filaments broad, slightly white-villous, connective rounded at apex; stamens of 3rd row similar but longer and rather more slender, the 2 basal glands broad, obtuse, stipitate; staminodes of 4th row cordate, acuminate, concave in front, slightly villous behind, rather longer (.75 mm.) than the glands. *Ovary* ovoid, narrowed into a short style; stigma somewhat bifid. *Fruit* globose, reddish-brown to black, rough, 3—4 cm. in diam., shortly apiculate, the basal ring of the fallen perianth very narrow.

PERAK: in dense jungle on low ground under 30 m. above sea-level, *King's Collector* 6615 !, 8479 !.

2. *BEILSCHMIEDIA KUNSTLERI*, Gamble in Kew Bull. 147 (1910). A large tree, reaching 24 to 30 m. in height and 60 cm. or more in diam. of stem; branches very stout, 1—2 cm. in diam. at the top; bark corky, rough, with prominent leaf-scars; leaf-buds thick, ovoid, scales ovate and rusty-puberulous. *Leaves* very coriaceous, opposite or alternate; obovate or obovate-oblong, rounded or obtusely acute at apex, long cuneate or attenuate at base; both surfaces glabrous, shining, prominently reticulate; margins recurved; 25—35 cm. long, 9—12 cm. broad; midrib stout, impressed on the upper, much raised on the lower surface; main nerves 10—12 pairs, irregular, impressed above, sharply raised beneath, starting at 40°—50° with the midrib and gently curving to and along the margin where they meet in irregular loops; secondary nerves and transverse nervules prominent, irregular as is the prominently raised reticulation; petiole very stout, rough, puberulous, 1.5—2.5 cm. long. *Flowers* velvety dark red, in axillary branching slightly puberulous panicles up to 20 cm. long; the rhachis angular flattened as are the branches; pedicels slender, 1—2 mm. long. *Perianth*-tube very short, flattened; lobes oblong, obtuse, glandular, 4 mm. long, glabrous except a ring below the stamens. *Stamens* of 1st and 2nd rows slender, 2—2.5 cm. long, filaments villous, connective acute, anther cells elongate; those of 3rd row similar, the 2 basal glands rounded stipitate, .5 mm. long; staminodes of 4th row cordate, acuminate, stipitate, concave in front, slightly villous behind, 1 mm. long. *Ovary* ovoid, gradually attenuate into a rather slender style; stigma obtuse. *Fruit* (young only) obovoid, rugose, glabrous, apiculate, the ring of the fallen perianth-lobes pale, undulate.

PERAK: in dense jungle on low ground near Larút, *King's Collector* 6854 !. SINGAPORE: at Bukit Timah, *Bayliss* 5885 !.

3. *BEILSCHMIEDIA MALACCENSIS*, Hook. f. in Fl. Br. Ind. V. 123 (1886). A tree; branchlets stout, shining, lenticellate, uppermost angular, innovations and leaf-buds dark purplish rusty-pubescent; buds ovate-lanceolate. *Leaves* coriaceous, alternate; elliptic or elliptic-oblong, obtuse or acute at apex, attenuate often unequally at base; both surfaces glabrous, upper greenish-brown when dry, paler along the nerves, moderately shining, lower reddish-brown; 12—20 cm. long, 6—10 cm. broad; midrib prominent beneath, slightly raised above; main nerves 8 to 12 pairs, slightly depressed above, very prominent beneath, starting at an angle of about 60° with the midrib and curving to and along the margin, the upper ones joining

in prominent loops; secondary nerves often prominent, branching into the prominently widely netted reticulations which are raised on both surfaces when dry; petiole very stout, rough, 1—2 cm. long. *Flowers* in axillary panicles up to 6 cm. long, usually ascending, the peduncle and divaricating branches stout, purplish rusty-pubescent, often flattened; bracts ovate-oblong, caducous; pedicels stout, densely purplish pubescent, 2—3 mm. long; in young fruit the scar of the fallen perianth making a white ring. *Perianth*-tube very short, spreading, flattened; lobes linear oblong, 3 mm. long, sparsely purplish-villous within. *Stamens* slender, those of the outer rows linear, 2 mm. long, pubescent; those of the inner row similar but slightly longer, the glands cordate, .75 mm. long; staminodes also cordate on pubescent filaments, 1—1.5 mm. long. *Ovary* conoidal, glabrous; style slender; stigma small, capitate. *Fruit* notseen. *B. Roxburghiana* β ? *malaccensis*, Meissn. in DC. Prodr. XV. i. 63.

MALACCA: Griffith!; Maingay K. D. 1260!. SINGAPORE: at Bukit Timah, Ridley 4424!

4. *BEILSCHMIEDIA CURTISII*, Gamble in Kew Bull. 148 (1910). A tree, reaching 15 to 20 m. in height; branchlets very stout, densely dark rusty-tomentose; leaf-buds ovoid with pale tomentum on the few scales. *Leaves* coriaceous, alternate; elliptic, rounded at apex with a very short acuminate point, rounded or obtusely acute at base; upper surface shining, olive green when dry, glabrous except on the midrib and main nerves, lower surface dark reddish-brown, rusty-villous throughout, tomentose on the nerves; margins recurved; 15—30 cm. long, 8—13 cm. broad; midrib stout, impressed and often keeled above, prominent beneath; main nerves 10 to 12 pairs, impressed above, prominently raised beneath, leaving the midrib at about 60° and only slightly curving to very close to the margin where they, at any rate the uppermost, join in loops; secondary nerves few, short; transverse nervules rather irregular and distant; reticulations visible on the upper surface as a prominently raised network; petiole very stout, rusty-tomentose, 2—3 cm. long. *Flowers* in short axillary rusty-tomentose corymbose panicles up to about 2.5 cm. long, elongating in fruit; bracts ovate, obtuse, caducous; pedicels rather slender, 1.5—2 mm. long. *Perianth*-tube obconical; lobes ovate or oblong, the outer slightly the larger, prominently rusty hispid-villous, 3—3.5 mm. long. *Stamens* slender, those of the outer rows 1.5—2 mm. long, obtuse, the cells oblong, the filaments villous; those of the third row rather longer but similar, the glands

very short, cordate; staminodes cordate, 1 mm. long, very shortly villous-stipitate. *Ovary* conoidal, glabrous; style slender; stigma small, capitate. *Fruit* oblong or obovoid, nearly black, smooth, 25 mm. long, 12—15 mm. broad, supported by the very narrow ring of the fallen perianth, the pedicels thickened to 3 mm. in diam.; pericarp woody.

PENANG: on Government Hill at 600 m. alt., *Curtis* 1015!; SINGAPORE: in garden jungle, *Ridley* 8075!

5. *BEILSCHMIEDIA SCORTECHINII*, Gamble in Kew Bull. 148 (1910). A tree; branches stout, their bark dark brown, rough, with large lenticels; branchlets stout, flattened, rusty-pubescent; buds lanceolate, rusty pubescent, 7 mm. long. *Leaves* coriaceous, sub-opposite; oblong-lanceolate, longitudinally folded when young, acuminate at apex, attenuate at base; upper surface glabrous except the midrib, lower rusty-puberulous when young, afterwards glabrescent but still rusty-brown; 12—20 cm. long, 3—5 cm. broad; midrib very stout, scarcely raised on the upper, very much so on the lower, surface; main nerves about 12 pairs, at an angle of about 60° with the midrib, gently curved to join in diminishing loops near the margin; reticulations irregular, very prominent, netted and raised on the upper surface; petiole very stout, rusty-pubescent, 1.5—2.5 cm. long. *Flowers* in axillary rusty-pubescent few-branched panicles reaching 12 cm. long and about 6 cm. broad; peduncle about 6 cm. long, those of branches about 2 cm.; all branches stout and often flattened; pedicels 2 mm. long; bracts and bracteoles very small, caducous; flower-buds globose. *Perianth*-tube campanulate, 1.5 mm. long; lobes oblong, 2.5 mm. long, rusty-villous within. *Stamens* of 1st and 2nd rows stout, 2 mm. long, filaments pubescent, connective obtuse or emarginate at apex; stamens of 3rd row as long as the others but more slender, emarginate at apex, their 2 basal glands rather large cordate stipitate; staminodes of 4th row cordate obtuse, concave in front, pubescent behind, scarcely larger than the glands. *Ovary* puberulous, style rather slender; stigma obtuse. *Fruit* not known.

PERAK: at Caulfield's Hill, 1220 m. alt., *Scortechini* 483! 493!.

6. *BEILSCHMIEDIA LUMUTENSIS*, Gamble in Kew Bull. 148 (1910). An evergreen tree (?); branchlets slender, glabrous, reddish-brown; buds linear, glabrous. *Leaves* coriaceous, opposite, prominently reticulate; elliptic to elliptic-oblong, acute at apex, attenuate at base;

both surfaces glabrous, shining, olive-brown when dry; 10—14 cm. long, 4—6 cm. broad; midrib rather slender, slightly impressed above, raised beneath; main nerves 8—10 pairs, the lowest quite close to the margin, at about 65° with the midrib, curved to anastomose near the margin and joined by an irregular prominent network of reticulation, all raised on both surfaces; petiole 7—12 cm. long, reddish. *Flowers* in axillary glabrous panicles of 4—5 slender elongate branches from a short (about 2—3 mm. long) thick peduncle which sometimes bears leafy branches; the branches 4—6 cm. long, ending in few-flowered cymes; pedicels slender; buds globose; flowers very small, subglabrous. *Perianth*-tube campanulate, glabrous, gland dotted; lobes short, ovate or nearly orbicular, glabrous except for a narrow villous ring at the base of the stamens, tube and lobes together about 1.5 mm. long. *Stamens* of 1st and 2nd row about 1 mm. long, connective acute; those of 3rd row similar, the 2 basal glands rather large; staminodes of 4th row cordate, stipitate, all glabrous, or the filaments slightly villous. *Ovary* ovoid, glabrous, tapering into a short style; stigma obtuse. *Fruit* not known.

PERAK: at Lumut Dinding, Ridley 10323!

7. BEILSCHMIEDIA MAINGAYI, Hook. f. in Fl. Br. Ind. V. 123 (1886). A tree: branchlets very stout, the pale brown corky bark marked by longitudinal clefts, prominent leaf scars and very large round lenticels; leaf-buds ovoid with densely rusty-tomentose scales. *Leaves* chartaceous, subopposite, often folded longitudinally; obovate or oblanceolate, abruptly acuminate at apex, narrowly acuminate at base; both surfaces glabrous, reddish-brown when dry; 12—24 cm. long, 4—14 cm. broad; midrib stout, impressed above and keeled; main nerves 7—9 pairs, distant, not very prominent, starting at 60° or less (lowest pair 30°) with the midrib and curving to the margin and along it and joined together by irregular branches and diminishing loops; reticulations irregular, prominent and slightly raised on both surfaces; petiole stout, curved, 1—2.5 cm. long. *Flowers* in dense axillary rusty-tomentose panicles up to 4 cm. long and 3—4 cm. broad; rachis and branches stout, usually flattened; bracts many, conspicuous, ovate, obtuse, densely rusty-tomentose, about 6—8 cm. long; bracteoles small; pedicels very short; buds cordate-globose. *Perianth*-tube very short; lobes ovate, broad, 3 mm. long, villous within. *Stamens* of 1st and 2nd row 1.5 mm. long, filaments thick, flattened, puberulous, anther-cells oblong, apex of connective obtuse; those of 3rd row similar but rather more acute

and 2.5 mm. long, the 2 glands close behind their bases large ovoid, glabrous, shortly stipitate; staminodes of 4th row ovate, obliquely acuminate, concave in front, densely pubescent behind, 1.5 mm. long. *Ovary* ovoid, sparsely villous; style elongate; stigma obtuse. *Fruit* not known.

PERAK: at Gunong Haram, *Scortechini* 727!; at Lumut, *Ridley* 3104!. MALACCA: Maingay K. D. 1268!

King's Collector 4554! and 5445! from Goping, Perak, 150—300 m. alt., may be fruiting specimens of this species. The leaves are rather smaller but have much the same texture and nervation. Should it prove to be so, the following must be added to the description:

Fruit ellipsoid-obovoid, 2.5—3.5 cm. long, 1.5 cm. in diam., somewhat acute at apex with an oblique tip, nearly black, smooth; pedicels enlarged to 5 mm. in diam., rusty-pubescent, ending in the much less enlarged ring of the fallen perianth; pericarp thick, granular.

Wray 1069! from lower Camp, Gunong Batu Pateh, Perak, is also, in all probability, a specimen of the fruit of a species of *Beilschmiedia* near to *B. Maingayi*. It may thus be characterized.

"A small tree; branchlets stout, dark-brown; buds glabrous, lanceolate, 1 cm. long. *Leaves* elliptic or elliptic-oblong, chartaceous, acute at apex, but usually sphacellate, narrowed at base; both surfaces glabrous; 12—20 cm. long, 5—6 cm. broad; main nerves 8—10 pairs, not very prominent, reticulations prominent on both surfaces; petiole 1—2 cm. long, twisted. *Fruit* oblong, oblique, obtuse at apex, up to 6 cm. long and 2 cm. in diam., the pericarp ferruginously rough, scurfy; pedicel greatly thickened." It cannot be named until the flowers are known.

8. *BEILSCHMIEDIA LONGIPES*, Hook. f. in Fl. Br. Ind. V. 123 (1886). A tree, reaching 15 to 20 m. in height and 40 to 50 cm. in diameter of stem; branchlets ashy-grey, longitudinally ribbed when dry, lenticellate; innovations and lanceolate leaf-buds ashy-grey-puberulous, the latter with few deciduous scales. *Leaves* thinly coriaceous, alternate; elliptic-lanceolate or -oblanceolate, acuminate usually cuspidately at apex, cuneate at base; upper surface shining, glabrous, often olive-green when dry, lower surface ashy-grey or rusty-pubescent, finally glabrate; 15—27 cm. long, 5—10 cm. broad; midrib rather slender, impressed above, raised beneath; main nerves 10—14 pairs, very prominent beneath, at an angle of 40° to 45° with the midrib, at first straight, then curving near the margin, all or only the upper ones joined in loops; transverse nervules and reticulations irregular, usually prominent on the upper surface; petiole stout, 12—20 mm. long. *Flowers* in lax elongate ashy-pubescent panicles reaching 10—13 cm. in length and 5 cm. in breadth; branches few,

alternate, distant, at right angles to the rhachis, bearing few-flowered cymules; bracts linear, short; pedicels 1 mm. long on side flower, 0 in central flowers; flowers yellow. *Perianth*-tube cupshaped, 1—5 mm. long; lobes ovate, rounded, densely grey tomentose without, puberulous within, as long as the tube. *Stamens* of 1st and 2nd rows 1.5 mm. long, filaments puberulous, anthers ovate, connective acute; those of 3rd row more slender and rather shorter, with 2 orbicular stipitate glands a little behind; staminodes of 4th row small, cordate, very shortly stipitate. *Ovary* glabrous; style short; stigma obtuse. *Fruit* (very young only) ovoid, glabrous, apiculate, the scar of the fallen perianth pale.

PERAK: at Sungie Larut, *Wray* 2291!; *Scortechini*!; forests near Larut chiefly on limestone, at 150 to 450 m. elevation, *King's Collector* 3859!, 4765!, 5465!, 5903!, 7238!, 7325! MALACCA: *Main-
gay*, K. D. 1248!

9. BEILSCHMIEDIA PERAKENSIS, Gamble in Kew Bull. 149 (1910). A shrub or small tree reaching 9—12 m. in height and 12—25 cm. in diam. of stem; branchlets slender, dark brown, sparsely pubescent; innovations densely tawny-pubescent as are the ovoid leaf-buds about 5 mm. long. *Leaves* chartaceous, membranous when young, alternate; elliptic or elliptic-obovate, shortly acuminate at apex, cuneate or attenuate at base; upper surface glabrous except on the midrib and main nerves, lower minutely puberulous especially on the nerves, at length nearly glabrous; both surfaces dull when dry, reddish brown; 8—15 cm. long, 4—7 cm. wide; midrib moderately stout, slightly impressed above, raised beneath; main nerves 10 to 12 pairs, usually irregular, starting at about 50° with the midrib and curved to the margin where they connect in loops, joined by rather prominent transverse nervules and reticulations which are conspicuous on the upper surface; petiole stout, densely pubescent, 5—10 mm. long. *Flowers* in slender axillary rusty-pubescent panicles reaching 10—14 cm. in length and scarcely 4 cm. in breadth; peduncle usually long; branches few, generally at right angles to the rhachis; cymules about 3-flowered; bracts and bracteoles linear; pedicels slender, of middle flower almost 0; *Perianth*-tube very short; lobes ovate, obtuse or slightly ovate, 1.5 mm. long. *Stamens* of 1st and 2nd rows slender, 1 mm. long, filaments puberulous, connective rounded; those of 3rd row similar but rather longer, the 2 basal glands ovoid, stipitate; staminodes of 4th row ovate, acute, rather small. *Ovary* oblong; style stout; stigma obtuse. *Fruit* oblong or obovoid, black

when dry, 12—15 mm. long, 7—8 mm. broad; pericarp thick; cotyledons separated by a false dissepiment; pedicels scarcely enlarged; ring of fallen perianth pale.

PERAK: *Scortechini*!; dense jungle on hills at 150—250 m. alt., *King's Collector* 8489!, 10026!, 10432!.

10. *BEILSCHMIEDIA PENANGIANA*, Gamble in Kew Bull. 149 (1910). An evergreen tree, reaching 10—12 m. in height; branchlets white with smooth shining bark, lenticels oblong; buds perulate. *Leaves* subcoriaceous, alternate or subopposite; elliptic or elliptic lanceolate, very obtusely acuminate at apex, acuminate at base; both surfaces glabrous, reddish-brown when dry, upper shining; 7—10 cm. long, 3—4 cm. broad; midrib broad, depressed on the upper surface; main nerves 10—12 pairs, irregular, much branched and joining in loops well within the margin, prominent on both surfaces; transverse nervules also prominent, branched, enclosing the obscure reticulation; petiole broad, .5—1 cm. long, the upper part bordered by the decurrent margins of the blade. *Flowers* in very short axillary bracteate racemes, the buds strobilate with orbicular fimbriate much gland-dotted slightly puberulous bracts, each enclosing one flower supported by two lanceolate acuminate fimbriate bracteoles 1.5 mm. long, the bracts and bracteoles afterwards caducous; pedicels thick. *Perianth*-lobes ovate, obtuse, ciliate, gland-dotted, 1 mm. long, sub-equal. *Stamens* of 1st and 2nd row 1 mm. long, glabrous, on thick filaments; those of 3rd row similar with a pair of suborbicular stipitate glands close to the bases of the filaments; staminodes of 4th row cordate, very shortly stipitate, .5 mm. long. *Ovary* globose, glabrous; style short; stigma obtuse. *Fruit* not known.

PENANG: at Penara Bukit at 300 m. alt., *Curtis* 1098!

Species imperfectly known.

11. *BEILSCHMIEDIA MEMBRANACEA*, Gamble in Kew Bull. 150 (1910). A small tree, reaching 4 to 6 m. in height and the stem 7 to 15 cm. in diameter; branchlets slender, grey, softly blackish-puberulous, innovations rusty-tomentose, as are the small ovoid buds. *Leaves* membranous, alternate; elliptic or elliptic-ovate, obtusely acute at apex, attenuate or slightly and unequally rounded at base; both surfaces olive-green when dry, somewhat shining, glabrous except on the midrib and main nerves; 10—15 cm. long, 5—8 cm. broad; midrib slender, raised on both surfaces; main nerves 9 to 11 pairs, starting at

an angle of about 45° with the midrib and curving to near the margin, where they anastomose in irregular loops; reticulations irregularly netted, raised and prominent on both surfaces; petiole thick, pubescent, 5—10 mm. long. *Flowers* not known, apparently in very short axillary cymes. *Fruit* oblong, smooth, up to 15 mm. long and 7 mm. in diameter; pedicel scarcely enlarged.

PERAK: in open jungle at 600 to 900 m. alt., *King's Collector* 10,928!

12. *BEILSCHMIEDIA PAHANGENSIS*, Gamble in Kew Bull. 150 (1910). A tree; branches slender, greyish-brown; branchlets dark brown, glabrous, lenticellate; leaf-buds very small, ovoid with grey-puberulous scales. *Leaves* chartaceous, alternate; lanceolate or oblong-lanceolate, obtusely acute at apex, long-attenuate or -cuneate at base; both surfaces glabrous, prominently reticulate, upper shining; 10—15 cm. long, 3—5 cm. broad; midrib rather slender, slightly raised on both surfaces; main nerves irregular, 10—12 pairs, usually at about 45° with the midrib, at first straight then branching to anastomose near the margin; nervules and reticulations irregular, prominently raised on both surfaces; petiole slender, 1—2 cm. long, rugose. *Flowers* not known, in axillary panicles up to about 6 cm. long; rachises slender. *Fruit* ellipsoid, obtuse at both ends, blackish with raised pale spots on tubercles, 2—2.5 cm. long, 1 cm. broad; cotyledons very fleshy, the false dissepiment membranous.

PAHANG: at Kwala Triang and Suboo Lanjoot, *Ridley* 2273!

13. *BEILSCHMIEDIA FOXIANA*, Gamble in Kew Bull. 150 (1910). An evergreen tree (?); branchlets smooth, thick, lenticellate, greenish-brown. *Leaves* coriaceous, subopposite, prominently reticulate; lanceolate or oblanceolate, bluntly acuminate at apex, long-cuneately narrowed at base; both surfaces dull, glabrous; margin slightly recurved; 12—16 cm. long, 5—7 cm. broad; midrib stout, slightly raised above; main nerves 7 pairs at from 40° — 50° with the midrib, oblique and slightly curved upwards to end close to the margin in a series of diminishing loops which join them; transverse nervules irregular and with the much netted reticulation prominent and more or less raised on both surfaces; petiole stout, 2—2.5 cm. long, the upper part bordered by the decurrent margins of the blade. *Inflorescence* paniculate, much branched, reaching 20 cm. in length, glabrous, the peduncle and its branches with oblong lenticels. *Fruit* ellipsoid, slightly pustular, 3.5 cm. long, 2—2.5 cm. broad; pedicels slightly

enlarged, rusty-brown, rugose; scar of the fallen perianth-tube pale, scarcely enlarged.

PENANG: at Birch's Hill, *Fox* 10705! (Herb. Singap.)

3. DEHAASIA, Blume.

Evergreen trees, the branchlets generally pale, the buds lanceolate. *Leaves* alternate, more or less coriaceous, penni-nerved, often fasciated at the ends of the branchlets. *Flowers* small, hermaphrodite, in axillary peduncled panicles of few-flowered dichasia. *Perianth-tube* very short; lobes 6, the 3 outer much the shortest. Perfect *stamens* 9, small, clavate, the anthers 2-celled; those of the 1st row opposite the outer shorter perianth-lobes, introrse; those of the 2nd row opposite the inner perianth-lobes, introrse; those of the 3rd row opposite those of the 1st row, extrorse, each furnished at the base and a little behind it with 2 rather large sessile glands; staminodes of the 4th row opposite the 2nd row stamens small or wanting, when present usually cordate stipitate. *Ovary* sessile, rounded, attenuate into a short style. *Fruit* an oblong berry, seated on the persistent broadened perianth which is supported by the very much thickened, usually red, often warted, clavate pedicel; cotyledons thick, fleshy; radicle minute.—DISTRIB. About 10 species; Indian and Malayan.

Staminodes of 4th row wanting; leaves chartaceo-coriaceous, over 15 cm. long and 7 cm. broad; flowers about 5 mm. in diam.

1. *D. microcarpa*.

Staminodes of 4th row present; flowers scarcely 3 mm. in diam.

Leaves chartaceous, lanceolate, not minutely reticulate, not fasciated at the tops of the branchlets ..

2. *D. nigrescens*.

Leaves coriaceous, more or less obovate, reticulate, fasciated at the top of the branchlets.

Staminodes of 4th row rather large; main nerves of leaves prominently impressed above; panicles pubescent ..

3. *D. cuneata*.

Staminodes of 4th row quite small, main nerves not prominently impressed; panicles glabrous ..

4. *D. Curtisii*.

Leaves very coriaceous, lanceolate, more or less fasciated; staminodes very small; main nerves and nervules of leaves prominently raised on both surfaces ..

5. *D. lancifolia*.

1. DEHAASIA MICROCARPA, Blume in Rumph. i. 162, t. 44 (1835).
A tree with spreading branches reaching 15 to 25 m. in height and

the stem 40 to 60 cm. in diameter; branchlets rather thick, glabrous, with white shining bark, lenticellate; leaf-buds conical, glabrous, up to 1 cm. long with few black scales. *Leaves* chartaceo-coriaceous, alternate; elliptic-oblong or -obovate or -oblanceolate, acute or acuminate at apex, cuneate or attenuate or sometimes unequally rounded at base; both surfaces glabrous, pale olive-green and shining when dry; 15—40 cm. long, 7—17 cm. broad; midrib stout, broad, prominent beneath; main nerves irregularly spaced, 9—15 pairs, usually 12, the lowest 1 or 2 pairs near the base, the rest more distantly spaced, all curving upwards to and along the margin where they meet in short loops, slightly impressed and keeled on the upper surface, prominent and white on the lower, joined by irregular transverse nervules and indistinct reticulations; petiole rather stout, channelled above, 1—3 cm. long. *Flowers* in erect, glabrous or slightly puberulous, reddish panicles from the upper axils and especially from below the terminal leaf-buds, 10 to 20 cm. long, 5—6 cm. broad; peduncles usually short, angular; branches at right angles to the rhachis, 1—2 cm. long, flattened, dichotomously branched; bracts small, ovate; bracteoles triangular; pedicels clavate, 2—5 mm. long; flower-buds ovoid; flowers yellowish-white. *Perianth*-tube very short, continuous with the pedicel; lobes 6, the outer 3 triangular, 1—1.5 mm. long, the inner 3 ovate, rounded, 2—3 mm. long, all glabrous or very minutely puberulous without. *Stamens* of the first and second rows 2.5 mm. long, filaments broad, white-villous, anthers short, the cells small, connective depressed at tip; stamens of 3rd row similar but rather longer, furnished a little behind their bases with glabrous sessile glands; staminodes of 4th row wanting. *Ovary* and slender style 2.5 mm. long; stigma obtuse. *Berry* black, oblong-ellipsoid, 4 cm. long; 2 cm. broad, seated on the much enlarged trigonous obconic scarlet-warted 2—3 cm. long pedicel which is surmounted by the persistent perianth-lobes; pericarp shining, thin; embryo depressed at apex. Hook. f. Fl. Br. Ind. V. 126; Koord. & Val. Bijdr. X. 201. *D. squarrosa*, Zoll. et Mor. in Zoll. Cat. 113, 115; Hassk. Retz. i. 8; Miq. Fl. Ind. Bat. 929. *Haasia microcarpa*, Nees Syst. Laur. 373; Meissn. in DC. Prodr. XV. i. 60; Miq. l.c. 928. *H. incrassata*, Nees Syst. Laur. 376; Miq. l.c. 930. *Laurus incrassatus*, Jack in Mal. Misc. ii. No. 7. 33 (ex Wall. Cat. 2589). *Persea incrassata*, Nees Syst. Laur. 127. *Machilus incrassatus*, Nees in Wall. Pl. As. Rar. ii. 70,

PERAK: *Scortechini* 1842!; at Gunong Kerbang, *Ridley* 14738!; at Trong, *Wray* 3188!; in dense forest, chiefly on limestone, up to

250 m. alt., *King's Collector* 4950!, 7360!, 7731!, 8204!, 8655!.
 MALACCA: *Griffith* K.D. 4252!; *Maingay* K.D. 1274!; at Panchor,
Goodenough 1264! SINGAPORE: at Turong, *Ridley* 10760!.—DISTRIB.
 Java, Sumatra, Borneo (*Haviland* and *Hose* 3090!, 3091!, 3332!,
 3655!).

2. *DEHAASIA NIGRESCENS*, Gamble in Kew Bull. 150 (1910). A tree, reaching 10—12 m. in height; branchlets slender, greyish-white, uppermost black when dry; leaf-buds black, lanceolate, without scales. *Leaves* chartaceous; lanceolate or oblanceolate, bluntly long-acuminate at apex, attenuate at base; both surfaces dark brown to black when dry, dull on the upper, glabrous; 8—13 cm. long, 3—4 cm. broad; midrib slender; main nerves 8—10 pairs at 40°—50° with the midrib, slender, curving upwards to meet in loops near the margin; reticulations irregular, inconspicuous; petiole slender, 1—2 cm. long. *Flowers* very small, in panicles from the uppermost leaf-axils, slender, glabrous, up to 10 cm. long; peduncle long; branches few, at right angles to rachis, dichotomous; pedicels clavate; buds globose. *Perianth*-tube cup-shaped, continuous with the pedicel; lobes small, the 3 outer triangular .75 mm. long, the 3 inner twice as long and ovate, all minutely golden-pubescent without, golden-villous within. *Stamens* of 1st and 2nd row clavate, .75 mm. long; connective obtuse; filaments villous; those of 3rd row similar and a little longer having 2 large cordate glabrous glands behind at the base; staminodes of 4th row .5 mm. long, cordate, rather smaller than the glands. *Ovary* globose; style short; stigma obtuse. *Fruit* a black obovate-ellipsoid drupe 2 cm. long by 1 cm. in diam., seated on the enlarged obconical, straight or curved, bright red (when dry—black), pedicel which is surmounted by the persistent perianth-lobes.

PENANG: on Government Hill, at 300 to 600 m. alt., *Curtis* 1183! SINGAPORE: Garden jungle, *Ridley* 13017!

I have taken a long time over the stamens of this species. The material afforded very few flowers and though most of the anthers were distinctly only 2-celled, I found a few which seemed to me to be as clearly 4-celled. The anthers are exceedingly minute and are villous so that it is difficult to examine them, and though I believe I am right in placing it in *Dehaasia*, it is quite possible that fresh specimens examined in the field may make its transfer to *Nothaphaë* necessary. It is noticeable that *Curtis'* material though all bearing the No. 1183 was certainly collected on different occasions and from different trees, some at 300 m., some at 600 m.

3. *DEHAASIA CUNEATA*, Blume Rumph. I. 164, t. 46 (1835).

A tree, reaching 12 to 15 m. in height and 25 to 40 cm. in diameter; branchlets moderately slender, with white bark, lenticellate; leaf-buds small, conical, tawny-velvety, without scales. *Leaves* coriaceous, variable, fascicled at the ends of the branchlets and the one or two upper joints as if verticillate; obovate, acute obtuse or rarely acuminate at apex, cuneate at base; upper surface black when dry, glabrous except on the midrib and main nerves; lower surface puberulous, glaucous or glaucescent; 7—15 cm. long, 3—7 cm. broad; midrib stout, impressed above, much raised beneath; main nerves 8 to 10 pairs, occasionally more, prominently impressed above and raised beneath, at first at about 45° with the midrib, curved upwards to near the margin where they are joined in gradually lessening loops; transverse nervules few, rather irregular; reticulations minutely areolate, raised on both surfaces; petiole stout, 5—15 mm. long or almost 0, usually bordered by the decurrent margins of the blade. *Flowers* very small, yellowish, in slender blackish puberulous panicles from the upper leaf-axils, up to 10 cm. long and 4 cm. broad; peduncle 4—5 cm. long; branches slender, dichotomous; cymules few-flowered; pedicels clavate, 2—3 mm. long; buds globose. *Perianth*-tube short; lobes ovate, obtuse, the outer three the shortest, puberulous on both sides. *Stamens* minute; those of 1st and 2nd rows clavate, rounded at apex, densely villous, .75 mm. long; those of 3rd row a little longer and with 2 large glabrous glands; staminodes of 4th row rather large, ovate-cordate, glabrous except a tuft of hairs at base, stipitate, .75 mm. long. *Ovary* rounded-conoidal; style almost none; stigma peltate. *Fruit* an ovoid oblong berry, 2—4 cm. long, seated on the enlarged perianth tube and a 2—4 cm. long thick enlarged warted pedicel, which is sometimes curved; pericarp bluish-black, smooth. Hook. f. Fl. Br. Ind. V. 125; Koord. & Val. Bijdr. X. 203. *Haasia cuneata*, Nees Syst. Laur. 378. *Cryptocarya cuneata*, Bl. Bijdr. 558. *Cyanodaphne cuneata*, Bl. Mus. Bot. Lugd. Bat. I. 333; Meissn. in DC. Prodr. XV. i. 76; Miq. Fl. Ind. Bat. I. 926. *C. tomentosa*, Bl. in Mus. Bot. Lugd.-Bat. I. 334; Miq. Fl. Ind. Bat. Suppl. 145. *Alseodaphne grandis*, Kurz For. Fl. II. 293 (not of Nees). *Dictyodaphne?* *Candolleana*, Meissn. in DC. l.c. 80. *Endiandra?* *Candolleana*, Kurz l.c. 295.

PERAK: at Thaiping, Wray 2099!, 2654!, 3101!; in dense low-level forest near Larut, King's Collector, 6745!; at Lumut Dinding, Ridley 3038!—DISTRIB. Burma, Java, Sumatra.

4. DEHAASIA CURTISII, Gamble in Kew Bull. 151 (1910). A

small tree; branchlets rather stout, stiff, rough especially just below the leaves, greyish-white; leaf-buds lanceolate acuminate with glabrous scales. *Leaves* coriaceous, in close fascicles at the ends of the branchlets; obovate, very obtusely acute at apex, long-cuneate at base; both surfaces glabrous and minutely reticulate, the upper dark grey, shining, the lower glaucous; margins recurved; 6–12 cm. long, 3–5 cm. broad; midrib prominent, raised on both surfaces; main nerves 10–12 pairs, raised on both surfaces, at about 70° with the midrib and curved to branch near the margin and so join in loops, joined by the prominently areolate raised reticulation; petiole 1–2 cm. long, black, channelled. *Flowers* very small, in slender dichotomous corymbose pedunculate glabrous panicles from the axils of upper leaves or the scars of fallen ones, about 6 cm. long; peduncles 4–5 cm. long, slightly flattened, branches slender; terminal cymes 3-flowered; pedicels clavate, 2–3 cm. long continuous with the perianth-tube. *Perianth*-tube cup-shaped; lobes ovate, obtuse, the outer three 1–1.5 mm. long, the inner three 1.5–2 mm. long, all slightly pubescent. *Stamens* very small, those of the 1st and 2nd rows .75 mm. long, clavate, villous, the connective emarginate; those of 3rd row similar but more square and a little longer, with 2 rather large glabrous glands at the base just behind; staminodes of 4th row very small, cordate, stipitate, villous behind. *Ovary* ovoid; style slender; stigma obtuse. *Fruit* ellipsoid, black when dry, smooth, 1 cm. long and .75 cm. in diameter seated on the clavate thickened pedicel 5 mm. long.

PENANG: at the Rifle Range, Government Hill, at 750 m. alt., *Curtis* 1193!. SELANGOR: top of Batu caves, *Kelsall* 1986!; *Ridley*!

Ridley's specimen has very small leaves under 5 cm. long and 2 cm. broad, and the small fruit here described, but there seems no reason to consider it other than a low-growing specimen of *D. Curtisii*.

5. *DEHAASIA LANCIFOLIA*, *Ridley* in Journ. Linn. Soc. XXXIII. 320 (1908). A small tree or large shrub reaching 7–8 m. in height and 28 cm. in diam. of stem; branchlets stout, glabrous, dark reddish brown, uppermost angled by lines decurrent from the leaves; buds very small. *Leaves* very coriaceous, glabrous, somewhat fascicled at the nodes; lanceolate or oblong-lanceolate, obtusely acuminate at apex, cuneate at base; both surfaces glabrous, reddish when dry; 15–20 cm. long, 3.5 to 7 cm. broad; midrib stout, very prominent beneath; main nerves 9–14 pairs, raised on both surfaces, at first straight afterwards curving to meet in loops near the margin; trans-

verse nervules few, irregular, raised on both surfaces enclosing obscure reticulations; petiole stout, 1—1.5 cm. long, bordered in the upper half by the decurrent margins of the blade. *Flowers* in elongate spreading panicles up to 10 cm. long, with few short pubescent branches ending in greenish cymules, the flowers 6—7 together in the cymules with short pubescent pedicels. *Perianth*-tube obconic, very short; lobes nearly glabrous, ovate, the outer 3 much shorter (.75 mm.) than the inner (1.75 mm.). *Stamens* nearly glabrous, those of the 1st and 2nd rows clavate with rounded apices 1 mm. long; those of the 3rd row similar but with a pair of rather large glabrous glands at the back of the filaments; staminodes of the 4th row ovate, .75 m. long, sometimes absent. *Ovary* ovoid, glabrous; style thick, curved; stigma large, thick, capitate. *Drupe* elliptic, 3—4 cm. long, the pedicel only slightly thickened.

PAHANG: on Gunong Tahan at 1500—2000 m. alt., H. C. Robinson and L. Wray 5468!, 5526.

Tribe III. ACRODICLIDIEÆ.

4. ENDIANDRA, R. Br.

Evergreen trees. *Leaves* alternate, penni-nerved, conspicuously reticulate-areolate, coriaceous; buds small, with leafy scales. *Flowers* small, hermaphrodite, in axillary or subterminal panicles. *Perianth*-tube very short; lobes 6, subequal or the inner rather smaller. *Stamens* of the 1st and 2nd row absent; those of the 3rd row 3, 2-celled, extrorse, thick, sessile, usually connivent over the ovary; staminodes of the 4th row none or minute or replaced by a fleshy ring; glands absent or 6 at the base of the perfect stamens. *Ovary* sessile, usually globose, surrounded by the perianth-tube; style short; stigma capitate. *Fruit* an oblong or subglobose berry, the pedicel sometimes thickened; perianth usually wholly deciduous. **DISTRIB.** About 15 species, Indian, Malayan and Australian.

The Malay Peninsula species all seem to belong to subgenus *Dictyodaphne*, Miq. characterized by the absence of staminodes and glands.

- | | |
|--|-------------------------|
| Leaves under 10 cm. long and 4 cm. broad, glabrous, main nerves 8 to 10 pairs; panicles glabrous | 1. <i>E. Maingayi</i> . |
| Leaves 10 to 13 cm. long and 6 cm. broad, pubescent beneath, main nerves 5—6 pairs; panicles densely tawny-pubescent | 2. <i>E. Kingiana</i> . |
| Leaves over 15 cm. long and usually 10 cm. broad, glabrous, main nerves 8-10 pairs; panicles nearly glabrous | 3. <i>E. praelava</i> . |

Species imperfectly known.

Leaves glabrous, more or less lanceolate, main nerves 5—7

pairs 4. *E. Wrayi*.

1. *ENDIANDRA MAINGAYI*, Hook. f. in Fl. Br. Ind. V. 127 (1886).

A large evergreen tree with spreading branches, reaching 20 to 25 m. in height and 40—50 cm. in diameter; branchlets rather slender, greyish-brown; leaf-buds small, with lanceolate glabrous stipules. *Leaves* coriaceous; elliptic or elliptic oblong, obtusely acute or subcaudately acuminate at apex, cuneate at base; both surfaces minutely areolate, glabrous, shining, reddish-brown when dry; 5—10 cm. long, 2—4 cm. broad; midrib slender, raised on both surfaces; main nerves 8 to 10 pairs, also slightly raised on both surfaces, otherwise inconspicuous, at first straight then curved near the margin to join in faint loops; reticulations prominently areolate; petiole 7—12 mm. long, slender, black, rugose. *Flowers* in short (about 3—4 cm.) axillary subracemose glabrous panicles of few-flowered (about 5) cymules, the rhachises angular, puberulous; pedicels slender, 1 mm. long; buds globose. *Perianth*-tube very short; lobes 2 to 2.5 mm. long, glabrous except a thickened granular-glandular cushion at the base, inner 3 lobes smaller and less imbricated than the 3 outer. *Stamens* thick, conoidal, connivent over the ovary which they enclose, prominently granular-glandular, 1.5 mm. long; anthers sessile, their cells distant, their lids up-curved curled backwards. *Ovary* globose; style short; stigma capitate. *Fruit* oblong or oblong-obovate, glossy black, smooth, 3—5 cm. long, about 2 cm. broad; fruiting pedicel slightly thickened; pericarp rather thin; cotyledons very fleshy.

PERAK: forests near Larút at 150—250 m., *King's Collector* 6103!, 8822!. MALACCA: *Maingay*, K.D. 1270!

2. *ENDIANDRA KINGIANA*, Gamble in Kew Bull. 151 (1910).

An evergreen tree with spreading branches, reaching 15 to 20 m. in height and a considerable diameter; branchlets stout, brown, the bark flaking off, much lenticellate, uppermost glandular-rusty-pubescent; buds short, ovoid, densely pubescent. *Leaves* coriaceous; elliptic, obtusely short-acuminate at apex, acute or cuneate at base; both surfaces shining, minutely areolate, upper glabrous except on the midrib and main nerves, lower softly pubescent, reddish-brown when dry; 10—13 cm. long, 6—7 cm. broad; midrib stout, thickly pubescent, raised on both surfaces; main nerves 5—6 pairs, pubescent and

impressed above, raised beneath, prominent, curved upwards to and along the margin where the upper ones join in loops; secondary nerves few, branching and irregular; reticulations prominently areolate; petiole stout, tawny-pubescent, rugose, 1.5—2 cm. long. *Flowers* in rather dense short (about 3—4 cm.) axillary and terminal thickly tawny-pubescent panicles of few-flowered cymules; pedicels extremely short or none; bracts very small, caducous; buds ovoid; flowers waxy yellowish-brown. *Perianth*-tube very short, tawny-pubescent; lobes imbricate, up to 3 mm. long, ovate-oblong, the outer longer than the inner ones, granular-glandular within especially at the base. *Stamens* thick, conoidal, 1.5—2 mm. long, connivent over the ovary which they enclose, prominently granular-glandular; anthers sessile, cells elongate, the lids up-curved and curled outwards. *Ovary* globose, glabrous, 5 mm. in diam.; style very short; stigma capitate. *Fruit* not known.

PERAK: in dense jungle at 150 to 250 m., *King's Collector* 64871.

Description largely after Sir G. King's notes.

3. *ENDIANDRA PRÆCLARA*, Gamble in Kew Bull. 152 (1910).

An evergreen tree reaching 15 to 20 m. in height and 45 to 60 cm. in diameter of stem, with spreading branches; branchlets stout, smooth, glabrous, striate, dark brown; leaf-buds small. *Leaves* chartaceo-coriaceous; elliptic-obovate or -oblong, shortly obtusely acute or acuminate at apex, cuneate or sometimes rounded at base; both surfaces glabrous, shining, conspicuously and minutely reticulate; 15—40 cm. long, 5—17 cm. broad; midrib stout, slightly depressed above, much raised beneath; main nerves 8—10 pairs, rather irregular, the lowest 1—2 pairs from close to the base and more oblique than the rest, all at first straight then curving gently to and along the margin when they join in a series of short loops; secondary nerves few; transverse nervules not more prominent than the minutely areolate reticulations which are raised on both surfaces; petiole stout, rugose, 10—15 cm. long. *Flowers* rather large, in branching nearly glabrous axillary and subterminal panicles reaching 20 cm. in length and about 10 cm. in breadth; peduncles 0 or very short; rachis glabrous, flattened; cymules puberulous, few-flowered (about 10); pedicels slender, 1—2 mm. long; flowers light yellow, the buds ovoid, 2—3 mm. in diameter. *Perianth*-tube cup-shaped, puberulous; lobes ovate, the outer three 2.5 mm. long somewhat larger than the inner 3, all glabrous without, granular-glandular at the base within. *Stamens* thick, conoidal, connivent over the ovary which they en-

close, 2 mm. long; connective prominently granular-glandular; anthers sessile, the cells distant, oblong, their lids up-curved and curled backwards. *Ovary* globose; style short, stigma capitate. *Fruit* oblong-ellipsoid, dark red, smooth, 8—10 cm. long, 4 cm. broad; pericarp rather thin; cotyledons very large, fleshy.

PERAK: at Tupai, Wray 3097!; near Larut up to 300 m. alt., King's Collector 4074!, 6714!.

Species imperfectly known.

4. *ENDIANDRA WRAYI*, Gamble in Kew Bull. 152 (1910). A small tree; branchlets slender, brown, lenticellate, uppermost angular, rugose; buds conical, acute. *Leaves* coriaceous; elliptic-oblong or oblanceolate, very obtusely acuminate at apex; acuminate cuneate at base; both surfaces minutely areolate, glabrous, shining; 7—14 cm. long, 2—5 cm. broad; midrib slender, raised on both surfaces; main nerves 5—7 pair, slightly impressed above, very oblique, at first straight then curving to join in loops near the margin; reticulations prominently areolate; petiole slender, 5 to 10 mm. long. *Flowers* in short axillary racemes or panicles, not otherwise known. *Fruit* oblong, black, smooth, 2.5 cm. long by 1 cm. broad, on a rather stout thickened peduncle.

PERAK: at 300 m. in Upper Perak, Wray 3785!.

Wray 2237 from Relan Tujur "a tree with dark green leaves and rusty-brown fruit" agrees as regards leaves fairly well with specimens of *Endiandra rubescens*, Miq. Fl. Ind. Bat. I, 1, 918 in the Kew and Calcutta Herbaria, but the fruit is rather different. It is oblong-ellipsoid, obtuse at apex, rather acute at base, 5—6 cm. long, 2—2.5 cm. broad, the pericarp rusty-brown, furfuraceously netted. Koorders and Valetton describe the fruit of *E. rubescens* as 'subterete or obovate-oblong, obtuse at apex, slightly incurved, oblique and truncate at base, sometimes striolate, 5—7 cm. long, 2—2.5 cm. broad.' A specimen in the Kew Herbarium has the pericarp black and smooth. Without flowers, I hesitate to describe the plant.

Tribe IV. MICROPORÆ.

5. *MICROPORA*, Hook f.

A tree with slender branchlets. *Leaves* alternate, penni-nerved, conspicuously reticulate; buds conical with leafy scales. *Flowers* small, hermaphrodite, in axillary few-flowered panicles or racemes. *Perianth*-tube very short, flattened; lobes 6, orbicular, equal. *Stamens* of the 1st and 2nd row 6, exsert, anthers sessile, thick, subquadrate, cells extrorse, distant, opening by two nearly circular pores,

lids upcurved; stamens of the 3rd and 4th rows reduced to short thick staminodes as large as the fertile anthers and produced above them. *Ovary* ovoid, sessile, quite smooth, narrowed into a very short style; stigma minute. *Fruit* ovoid, seated on the persistent and accrescent perianth and stamens.—DISTRIB. One species.

1. *MICROPORA CURTISII*, Hook f. Ic. Plant. t. 1547 (1886). An evergreen tree, reaching 12 to 18 m. in height and 40 to 50 cm. in diameter of stem; branchlets slender, corky, greyish-brown, lenticellate, puberulous; buds long-conical; scales lanceolate, tawny-villous. *Leaves* thinly coriaceous, membranous when young and then black when dry; elliptic, acute at apex, attenuate at base; both surfaces reticulate-areolate, reddish-brown, glabrous except on the midrib beneath; 6—13 cm. long, 3—6 cm. broad; midrib prominent, nearly flat above, raised beneath; main nerves 8 to 10 pairs, curved gently to the margin and there joined by loops, raised on the lower surface, joined by an elegant network of reticulations; petiole 10—20 mm. long. *Flowers* in short few-flowered tawny-puberulous racemes or panicles 2—3 cm. long; bracts lanceolate, 1—2 mm. long; pedicels as long; buds globose, as are the flowers which are 2—2.5 mm. in diam., light yellow when fresh. *Perianth*-tube flat; lobes orbicular, about 1 mm. long, ciliate; stamens and staminodes puberulous and ciliate. *Ovary* glabrous. *Fruit* ovoid, rugose, 3—4 mm. long (immature); accrescent perianth and stamens nearly 2 mm. thick. Hook f. Fl. Br. Ind. V. 862. *Hexapora Curtisii*, Hook. f., l.c. 189.

PENANG: at Government Hill, 300 m., *Curtis* 525!, 1214!; *Ridley* (?) 3153!. PERAK: open jungle near Larut, at 250—300 m. *King's Collector* 5215!. PAHANG: Kwala Triang, Lubu Lanjoot, on the Pahang river (*Ridley* in Trans. Linn. Soc. 2nd Ser. iii, 341).

I have quoted *Ridley's* Pahang citation; but the specimens in the Singapore Herbarium from Kwala Triang (No. 2273) and Lubu Lanjoot are not those of *Micropora*, but of a species of *Beilschmiedia*.

Tribe V. CINNAMOMEÆ.

6. CINNAMOMUM, Blume.

Evergreen trees or shrubs, usually with aromatic bark. *Leaves* opposite, sub-opposite or alternate, 3-ribbed or (Sect. *CAMPHORA*) penninerved. *Flowers* small, hermaphrodite or by abortion polygamous, in axillary or subterminal panicles or sometimes lateral at the base of the youngest shoots, the branches usually ending in dichasia, the

middle flowers of which are the largest and most fertile. *Perianth*-tube short, funnel-shaped, enlarged in fruit; lobes 6, subequal, persistent or partly truncate or deciduous in fruit. *Stamens* 9 perfect or by abortion fewer, anthers 4- or occasionally 2-celled; those of the 1st row opposite the outer perianth-lobes, introrse, eglandular; those of the 2nd row similar, opposite the inner perianth lobes; those of the 3rd row opposite those of the 1st row, extrorse or with lateral anther-cells, the filaments bearing two glands which are sessile or stipitate and usually near the middle, but sometimes at the base and nearly free; staminodes of the 4th row opposite the 2nd row stamens cuneiform cordate or sagittate, stipitate. *Ovary* sessile at the bottom of the perianth-tube and free from it, narrowed into the style; stigma discoid or obscurely 3-lobed. *Fruit* a berry seated on the usually cup-shaped enlarged perianth-tube, the lobes persistent, deciduous or sometimes truncate near their middle. *Seed* conform to the fruit; testa membranous; cotyledons fleshy.—*DISTRIB.* About 140 species, of tropical and subtropical Eastern Asia, Australia and the Pacific.

Leaves opposite or sub-opposite, with 3 or more ribs; inflorescence buds naked or with small scales; stamens rather large with ovoid or oblong anthers and elliptic cells; perianth-lobes persistent or tube truncate after flowering (Sect. I. *MALABATHRUM*).

Midrib without main nerves, but with transverse nervules between it and the side ribs.

Leaves glabrous, at any rate when mature.

Flower-panicles very short, slender, glabrous; leaves caudate at apex ..

1. *C. graciliflorum*.

Flower-panicles elongate, puberulous.

Leaves ovate, acute at apex, side ribs scarcely reaching $\frac{3}{4}$ ths of the length of the blade; fruiting perianth large, ribbed, with persistent lobes ..

2. *C. zeylanicum*.

Leaves oblong, side ribs reaching to near the apex.

Side ribs reaching the apex and there joining the midrib, leaves often very large; fruiting perianth small, with persistent lobes ..

3. *C. iners*.

Side ribs reaching the base of the acumen only.

Acumen attenuately long, very obtuse at tip; inflorescence sparsely puberulous; stamens stout, nearly glabrous

4. *C. Ridleyi*.

Acumen prominent, abrupt.

- obtuse at tip; leaves more than 4 cm. broad, transverse nervules distinct; inflorescence grey-pubescent 5. *C. rhyncophyllum*.
- Acumen merely acuminate, almost acute at tip; leaves under 4 cm. broad, transverse nervules indistinct; inflorescence very tawny-pubescent 6. *C. lampongum*.
- Leaves lanceolate, acuminate with obtuse apex, side ribs ending 2-3 cm. below apex; fruiting perianth smooth, glabrous, the lobes deciduous 7. *C. vimineum*.
- Leaves elliptic, obtuse at apex, side ribs reaching only $\frac{1}{3}$ ths the length of blade 8. *C. Deschampsii*.
- Leaves hairy, at any rate on the under surface
- Leaves large, usually over 12 cm. long.
- Leaves with prominent ladder-like transverse nervules and abrupt acumen; flowers in terminal stout panicles 9. *C. javanicum*.
- Leaves without prominent ladder-like transverse nervules, the acumen attenuate; flowers in axillary slender panicles 10. *C. molliissimum*.
- Leaves small, usually much under 12 cm. long.
- Leaves with greyish-tawny pubescence, shortly and obtusely acuminate at apex, rounded at base, the side nerves to outer ribs prominent 11. *C. Seortechnii*.
- Leaves with golden-tawny pubescence, attenuately long-acuminate at apex, acuminate at base, without side nerves to outer ribs 12. *C. aureo-fulvum*.
- Midrib with several pairs of main nerves; leaves lanceolate, cinereous 13. *C. cinereum*.
- Leaves alternate or rarely subopposite, penninerved, 1-ribbed; inflorescence buds perulate; stamens very small, with rounded obtuse anthers and usually circular anther-cells; perianth-lobes quite deciduous after flowering (Sect. II. CAMPHORA).

Leaves concolorous, pitted in the axils of the

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|---|-------------------------------|
| nerves; filaments as long as or longer than anthers, lower cells elliptic | 14. <i>C. inunctum</i> . |
| Leaves glaucous beneath, not pitted in the axils of the nerves; filaments scarcely as long as anthers, lower cells circular | 15. <i>C. Parthenoxylon</i> . |

1. CINNAMOMUM GRACILIFLORUM, Gamble in Kew Bull. 218 (1910). An evergreen tree (?); branchlets slender, terete, brown, the younger slightly puberulous; leaf-buds lanceolate, grey-pubescent. *Leaves* chartaceous, opposite or subopposite; elliptic, elliptic-ovate or -lanceolate, the apex with a long (1—2.5 cm.) caudate acumen obtuse at tip, base acute or slightly rounded; both surfaces glabrous, grey when dry, the upper shining, the lower dull and glaucescent; 7—13 cm. long, 3—6 cm. broad; ribs 3, slightly raised on the upper, more so on the lower surface, usually with a small extra pair starting along or close to the margin and finally forming a slender looped intramarginal ring, the midrib produced to the tip of the acumen, the next pair curved to the base of the acumen and continued in small loops; side nerves outside the pair many joining the sinuses of the intramarginal loops; transverse nervules irregular, arched; reticulation areolate; petiole slender, black, 5—10 mm. long. *Flowers* in very slender few-flowered axillary or lateral racemes up to 4 cm. long; peduncles capillary, glabrous; pedicel scapillary, clavate at tip; flowers 3—5, glabrous without. *Perianth*-tube campanulate, 1 mm. long, glabrous within; lobes ovate-oblong, grey-pubescent within, 2 mm. long. *Stamens* very slender, glabrous except a few scattered bristles and a small tuft at base, 2 mm. long; anthers 4-celled with the upper pair of cells minute, or 2-celled only; those of 1st and 2nd rows with small ovate anthers; those of 3rd row similar and with a pair of reniform or oblong glabrous sessile glands towards the top of the filament; staminodes of 4th row cordate acute. *Ovary* ovoid with a tooth near the top, glabrous; style slender; stigma small, capitate. *Fruit* an ovoid drupe 10 mm. long and about 8 mm. in diameter seated on a glabrous cupule formed of the enlarged perianth-tube bordered by the semi-deciduous lobes, the cupule about 6 mm. in diameter; pedicel also obconically thickened; pericarp yellowish, shining, crustaceous.

PERAK: at Gunong Ijuk, *Scortechini* 1228!; in upper Perak, *Wray* 3664!.

This species resembles in leaf a small-sized var. of *C. rhyncophyllum*; but the flowers are completely different. It seems to come near to *C. Burmanni*, Bl.; but the leaves of that species are thicker and have not the long caudate

acumen. The nearest relation, however, is *C. pauciflorum*, Nees, from which it differs in the thinner more oblong leaves and the side ribs reaching to the very base of the acumen.

2. CINNAMOMUM ZEYLANICUM, Blume Bijdr. 568 (1825). A moderate-sized evergreen tree with rather thick aromatic bark, smooth when young; branchlets terete, dark brown, the uppermost subquad-rangular; leaf-buds ovoid, finely silky. *Leaves* coriaceous, opposite or subopposite; ovate or ovate-lanceolate, acute or obtusely acuminate at apex, acute or rounded at base; both surfaces glabrous; 8—16 cm. long, 4—8 cm. broad; midrib stout, slightly raised above, more so beneath; side ribs 1 or sometimes 2 pairs, when 2 pairs the outer pair slender short close to the margin, the main pair strong at first along-side the midrib for 5—10 mm. then curved to about three-fourths of the length of the leaf when they disappear in faint loops; transverse nervules irregular, rather distant, arched, hardly visible; reticulation under the lens minutely areolate; petiole broad, dark, 1—2 cm. long. *Flowers* numerous, in silky-pubescent lax axillary panicles up to 17 cm. long; peduncles slender, quadrangular, usually glabrous; branches spreading, trichotomous, ending in 3-flowered dichasia; pedicels slender, grey-puberulous; bracts ovate acute, caducous; buds subglobose, grey-puberulous. *Perianth*-tube short, continuing the pedicel, 1—2 mm. long, glabrous within; lobes oblong or ovoid-oblong, the outer rather longer and sometimes spatulate 3—5 mm. long, densely silky within. *Stamens* slender, those of 1st and 2nd rows spatulate, 2—3 mm. long, the filaments slightly pubescent, the anther-cells large slightly overlapping, those of 3rd row with small anthers and a pair of large reniform or oblong glabrous sessile glands about half-way up the slightly puberulous filaments; staminodes of 4th row slender, heads small, cordate-sagittate, filaments nearly glabrous, 1—2 mm. long. *Ovary* ovoid, glabrous; style slender; stigma large, peltate. *Fruit* an oblong or ovoid-oblong berry 15—17 mm. long, 7—8 mm. in diameter seated on and partly immersed in the cupular enlarged perianth and its persistent lobes, the cupule 7—8 mm. in diam., often strongly ribbed; pericarp smooth, brown and shining when dry, purple when fresh. Nees Syst. Laur. 45 and in Wall. Pl. As. Rar. II. 74 and III. 32; Meissn. in DC. Prodr. XV. i. 13; Miq. Fl. Ind. Bat. I. i, 898; Wight Ic. tt. 123, 129, 134; Wall. Cat. 2573; Kurz For. Fl. II. 287; Hook. f. Fl. Br. Ind. V. 131; Trimen Fl. Ceyl. III. 440; Cooke Bomb. Fl. II. 535; Prain Beng. Plants 898; Brandis Ind. Trees 533; Baillon Hist. des Pl. II. 429. t. 240; Engl. & Prantl Naturl. Pflanzenfam. III. ii.

113, t. 73. *Laurus Cinnamomum*, Linn. Sp. Pl. 369; Roxb. Fl. Ind. II. 295.

MALACCA: Griffith K.D. 4246—1!; Chin Singh's Plantation (cult), Maingay K.D. 4241!. SINGAPORE: Ridley 8099 (cult.)!, garden jungle 12595!; Hullett 7!; Cantley 148!, 207!. The Cinnamon tree.—DISTRIB. South India and Ceylon, elsewhere cultivated only.

This species does not seem to be indigenous in the Malay Peninsula, but it has been cultivated and seems to have run wild. I have quite failed to identify the available specimens with the published varieties.

3. CINNAMOMUM INERS, Reinw. in Blume Bijdr. 570 (1825). A tree, reaching 15 to 20 m. in height and up to 40 cm. in diam. of stem; branchlets terete, dark grey-brown, prominently lenticellate, uppermost appressed-puberulous; leaf-buds conical, grey-silky, 5 mm. long, with small scales; innovations grey-pubescent. *Leaves* chartaceous to coriaceous, opposite or alternate, very variable in size and often sphacelate at apex; elliptic or elliptic-oblong or -lanceolate, sometimes linear-lanceolate or linear-oblong, obtuse or acute at apex, rounded or acute at base, 3-ribbed; both surfaces glabrous when old, slightly puberulous beneath when young, when very young usually ashy-grey-pubescent; upper surface shining, lower dull and pale or almost glaucous; margins usually reflexed, cartilaginous; 6—25 cm. long (sometimes to 40 cm. in young trees and coppice shoots), 2 to 12 cm. broad; midrib stout, raised, straight to the apex, side ribs from the base or leaving the midrib a little above it, uniformly curved to meet it and each other again at the apex; transverse nervules between the mid and side ribs subparallel, horizontal or slightly arched; nerves between the side ribs and margin looped; reticulation under the lens minutely areolate, in old large leaves scarcely seen; petiole 1—2 cm. long, stout, sometimes twisted. *Flowers* yellowish in grey-silky pedunculate subterminal or axillary spreading panicles of variable length from 5 to 25 cm.; branches lax, dichotomous, ending in 3- or 7-flowered dichasia; bracts and bracteoles very small, caducous; pedicels 3—6 mm. long; buds globose. *Perianth*-tube funnel-shaped, 1.5 to 2 mm. long, glabrous within; lobes ovate, acute, 2.5—3.5 mm. long, subequal, sericeous within as without, prominently nerved and dotted, spreading during flowering, then closing up vertically. *Stamens* 2 to 2.5 mm. long, those of the 1st and 2nd rows with ovate anthers with large slightly overlapping cells and slightly villous filaments and connective; those of the 3rd row with

oblong anthers and with two cordate or sagittate stipitate glands from the base or a little above it, the base and the filaments villous; staminodes of 4th row cordate-sagittate, glabrous, 1.5 mm. long, villous-stipitate. *Ovary* obovoid, rounded at top, glabrous; style slender; stigma large, peltate. *Fruit* an ellipsoid berry, subtruncated at apex, 10—15 mm. long, 5—7 mm. in diameter, seated on and partly immersed in the cupular enlarged perianth-tube and persistent lobes, the cupule 5 mm. in diameter; pericarp smooth, dull, obscurely ribbed. Blume in Rumph. I. 41, tt. 17, 18; Miq. Fl. Ind. Bat. I. i, 897; Meissn. in DC. Prodr. XI. i, 19 var. *a*; Nees in Wall. Pl. As. Rar. II. 73; Wall. Cat. 2583 E; Wight Ic. t. 122; Kurz For. Fl. II. 287; Hook. f. Fl. Br. Ind. V. 130; Koord. & Val. Bijdr. X. 75. *C. nitidum*, Bl. Rumph. I. 35, t. 15; Hook. f. l.c. *C. Griffithii*, Meissn. l.c. 19. *Laurus nitida* Roxb. Fl. Ind. II. 300; Wall. Cat. 2582 excl. *B. Laurus malabathrum*, Wall. Cat. 2583A.

PENANG: Wallich 2573A!; Phillips!; G. King!; Curtis 156! 1548! 2252!. PROVINCE WELLESLEY: Ridley 9381!. PERAK: various places up to 1400 m. alt. Wray 274!, 556!, 1222!, 2674!, 2768!, 3088!, 3175!, 3328!; King's Collector 425!, 5705!, 6456!, 6510!, 7603!; Scortechini 323!, 1381!. SELANGOR: at Bukit Kuta, Good-enough 10540!; at Kwala Lumpor, Curtis! Ridley 15581!. PAHANG: at Pekan, Ridley 1144. MALACCA: Griffith K.D. 4240!, 4242!, 4246!. Maingay K.D. 1242!, 1243!. SINGAPORE: Hullett 81!; Ridley 3370!, 4703!—DISTRIB. Burma, Java, Sumatra, Borneo, etc.

Kunstler (King's Collector) has sent from Larut his No. 3861! which seems to be undoubtedly this species, but the fruit and fruiting calyx are badly distorted by a fungoid disease.

4. CINNAMOMUM RIDLEYI, Gamble in Kew Bull. 218 (1910). An evergreen tree; branchlets dark purplish-brown, smooth, younger angular and grey-puberulous as are the lanceolate buds. *Leaves* chartaceous, opposite or subopposite; elliptic-lanceolate, long attenuate-acuminate at apex with a blunt acumen, acute at base; both surfaces glabrous, reddish-brown when dry, the upper shining; margin cartilaginous; 10—17 cm. long, 2.5—6 cm. broad; ribs 3, prominent, the midrib extending to the extreme apex, the side ribs starting from the base or up to about 5 mm. above it and vanishing at the base of the acumination; main nerves none except about 6 pairs arching outside the side ribs; transverse nervules many, subparallel, arched; reticulation obscure; petiole nearly black, 10—15 mm. long. *Flowers* in grey-tomentose pedunculate axillary or

lateral branching panicles up to 10 cm. long on the upper branchlets; branches subopposite, slender, ending in 7-flowered dichasia; bracts minute, lanceolate, deciduous; pedicels slender; buds obovate. *Perianth*-tube short, villous within; lobes ovate, 2.5 mm. long, villous within. *Stamens* with subglabrous filaments; those of the 1st and 2nd rows 2 mm. long, spathulate, with oblong anthers and small upper cells; those of the 3rd row also 2 mm. long, bearing a pair of cordate sessile glands attached near the middle of the filaments; staminodes of 4th row cordate, 1 mm. long, villous-stipitate. *Ovary* ovoid, glabrous; style slender; stigma peltate, lobed. *Fruit* ovoid, apiculate, 10 mm. long, 7—8 mm. in diameter, seated on the cup-shaped glabrous enlarged perianth-tube about 5 mm. in diam. at mouth, the mouth entire, the lobes deciduous; pericarp black when dry, shining.

SINGAPORE: at Changi road, Ridley 4823!

This species has puzzled me much: it comes near *C. vimineum* in the acumination of the leaves and in inflorescence it resembles *C. Lampongum* and *C. rhynophyllum* which are very near each other. The fruiting sheet (Herb. Singap.) bears on its label only 'Singapore' but no collector's name. The leaves resemble those of *C. pauciflorum*, but the inflorescence is quite different.

5. CINNAMOMUM RHYNOPHYLLUM, Miq. Fl. Ind. Bat. I. i. 895 (1855). A small tree reaching 15 m. in height of stem and a diameter of 30—40 cm.; branchlets slender, subtetragonous, pale brown or greyish, uppermost grey-puberulous as are the conical leaf-buds. *Leaves* chartaceous, opposite or subopposite, aromatic, smelling of cardamoms (Wray); elliptic or elliptic-oblong, the apex with a long (1—2 cm.) straight or oblique acumen obtuse at tip, the base acutely attenuate; both surfaces very pale when dry, glabrous, the upper shining, the lower dull glaucescent; 12—18 cm. long, 4—6 cm. broad; ribs 3 prominent, the outer pair from the top of the petiole sometimes following the margin for a short distance, then about half-way between the midrib and margin to end just below the acumen; nerves outside this pair many, oblique or not, joining in an intramarginal looped nerve; transverse nervules many, regular, subparallel, slightly arched; reticulation finely areolate; petiole rather stout, 7—14 mm. long. *Flowers* pale yellow, waxy-looking, in grey-tomentose pedunculate axillary branching panicles up to 17 cm. long; branches many, subopposite, slender, ending in 7-flowered dichasia, the middle flowers usually the largest and perhaps alone fruit-bearing; bracts lanceolate, minute, caducous; pedicels slender; buds globose.

Perianth-tube short, villous within; lobes ovate, acute, 3 mm. long, thickened at the back. *Stamens* with villous broad filaments; those of the 1st and 2nd rows 1.5 to 2 mm. long spathulate with ovate anthers and minute upper cells; those of the 3rd row 2 mm. long with oblong anthers and submarginal cells, the upper very minute, the glands obliquely cordate glabrous, very shortly stipitate, attached near the middle of the filaments; staminodes cordate, glabrous within, villous without, 1 mm. long. *Ovary* ovoid-globose; style rather slender; stigma obliquely peltate, 2—3-angled. *Fruit* not seen. Meissn. in DC. Prodr. XV. i. 11.

PERAK: at Tapa, Wray 1304!; in open forest near Larut up to 150 m. alt., King's Collector 3287!.—DISTRIB. Sumatra.

6. CINNAMOMUM LAMPONGUM, Miq. Fl. Ind. Bat. Suppl. 358 (1862). A medium-sized tree; branchlets slender, terete, uppermost quadrangular, minutely grey-puberulous; leaf-buds conical, grey-silky-pubescent. *Leaves* pergamaceous, opposite or subopposite, yellowish when dry; oblong-lanceolate or elliptic-lanceolate, long acuminate at apex, acute at base; upper surface shining glabrous, lower dull glaucous; 5—15 cm. long, 2—4 cm. broad; ribs three raised on both surfaces, the midrib produced to the tip of the acumen, the side nerves to its base; nerves outside them many, short, united in a looped intramarginal nerve; transverse nervules subparallel, arcuate, indistinct; petiole 5—10 mm. long, dark. *Flowers* in axillary or subterminal grey-brown pubescent panicles up to 12 cm. long, the rachis quadrangular; branches few spreading, ending in dichasia; pedicels slender. *Perianth*-tube very short; lobes ovate-orbicular, obtuse, 1.5 cm. long, villous within, 5-nerved. *Stamens* small, with very small upper anther-cells and slender filaments; those of 1st and 2nd rows with ovate obtuse anthers; those of the 3rd row with smaller anthers and a pair of large cordate stipitate glabrous glands inserted at the middle of the villous filaments; staminodes of 4th row small, ovate-acuminate, villous-stipitate. *Ovary* ovoid, attenuated into a rather thick style; stigma with 2—3 recurved lobes. *Fruit* ovoid, truncate, 10—12 mm. long, 7—8 mm. in diameter, seated on the enlarged persistent thickened cup-shaped perianth tube 6 mm. long, 10 mm. in diam. crenulate on the margin; pericarp yellowish when dry, smooth, shining.

PERAK: in open jungle up to 240 m. alt. near Larut, King's Collector 4802!, 6595!.—DISTRIB. Sumatra (Teysmann, Forbes 2969!).

The description of the fruit is taken from K.C. 4802 which has rather smaller and narrow leaves and shorter inflorescence, but seems to be this species.

7. CINNAMOMUM VIMINEUM, Nees in Wall. Pl. As. Rar. II. 76 (1831). A small evergreen tree; branchlets slender, terete, reddish brown, glabrous, younger subcompressed, minutely hoary-pubescent as are the innovations. *Leaves* opposite or subopposite, chartaceous; lanceolate, long acuminate at apex with an obtuse acumen, acute at base; both surfaces glabrous, upper shining, lower pale; 8—12 cm. long, 2—4 cm. broad; ribs 3, divergent from the base or slightly above it, the midrib extending to the apex, the side ones to about 2—3 cm. below it; main nerves none; transverse nervules many, irregular, very obscure, enclosing an obscure areolate reticulation; petiole slender, 7—10 mm. long, glabrous. *Flowers* in short lateral few-flowered panicles from the internodes of upper branchlets, glabrous, very small. *Fruit* ovoid, apiculate, 10 mm. long, 7.5 mm. in diam., seated on the cup-shaped glabrous smooth enlarged perianth with smooth margins, this again supported by the obconic glabrous enlarged pedicel 7 mm. long; pericarp smooth, yellow when dry. Nees Syst. Laur. 82; Meissn. in DC. Prodr. XV. i. 19; Miq. Fl. Ind. Bat. I. i. 904; Hook. f. Fl. Br. Ind. V. 131. *Laurus viminea*, Wall. Cat. 2578.

PENANG: Porter!; on West Hill at 750 m. alt., Curtis 1571!

8. CINNAMOMUM DESCHAMPSII, Gamble in Kew Bull. 219 (1910). A tree; branchlets slender, terete, dark brown; leaf-buds broadly ovoid, 3 mm. long, densely white-silky. *Leaves* subcoriaceous, opposite or subopposite; elliptic-ovate or -oblong, obtuse at apex and glandular-apiculate, rounded or slightly attenuate at base; both surfaces glabrous, ashy-grey when dry, the upper shining the lower glaucous; margin cartilaginous slightly recurved; 7—11 cm. long, 4—6 cm. broad; ribs 3, slightly raised on the upper surface, the midrib straight to the apical gland, the side pair from the base or very little above it, widely curving upwards to about three-fourths of the distance to the apex where they break into slender loops and sometimes join a single pair of slender nerves; outside nerves about 3, indistinct, widely looped; transverse nervules subparallel, arched, indistinct as is the areolate reticulation; petiole black, 5—10 mm. long. *Flowers* moderate-sized in slender lax pedunculate axillary greyish-silky panicles up to 15 cm. long; peduncles filiform, 4—7 mm. long; branches also filiform ending in dichasia of usually 7 flowers;

pedicels very slender, about 5 mm. long. *Perianth*-tube very short, scarcely 1 mm. long, glabrous within; lobes oblong, acute, 2—3 mm. long, grey-silky-pubescent on both sides. *Stamens* slender, 1—2 mm. long, the filaments nearly glabrous; those of the 1st and 2nd row, with oblong anthers and large cells scarcely overlapping; those of the 3rd row with narrower anthers, the lower cells large the upper minute; the basal glands thick, reniform-cordate, glabrous, stipitate attached a little above the base of the filaments; staminodes of 4th row sagittate, 1 mm. long, villous-stipitate. *Ovary* obovoid; style rather thick; stigma peltate. *Fruit* not seen.

PENANG: roadsides in the mountains, *Deschamps*!. SINGAPORE: in garden jungle, *Ridley* 12595!

Ridley says he believes this to be an introduced plant, perhaps coming from S. India, perhaps from China, but I cannot identify it.

9. CINNAMOMUM JAVANICUM, Blume Bijdr. 570 (1825). An evergreen tree or shrub; branchlets subquadrangular, densely pale tawny-tomentose when young, darker and nearly black when old; buds small. *Leaves* chartaceous, subopposite, very prominently nerved; elliptic or elliptic-oblong, abruptly long acuminate at the apex, cuneate or attenuate at the base; upper surface shining glabrous except on the ribs which are villous when young, bullate between the transverse nervules, lower surface long-villous especially on the ribs and nervules, the hairs pale brown when young darker when old; margin cartilaginous; 17—40 cm. long, 1—12 cm. broad; 3-ribbed from about 5 mm. (1—2 cm. when young) above the base, the ribs very strong and raised on both surfaces, the midrib reaching to the tip of the acumen, the side ribs to a little above its base, outside them and close to the margin a regularly looped intramarginal nerve; transverse nervules many, regular and straight or branched forming ladder-like bars between the ribs and between the outer ribs and the looped nerve, impressed above when young, not so when old; reticulation minutely netted, prominent when young; petiole stout, densely tawny-tomentose, 1—3 cm. long. *Flowers* in tawny-tomentose subsessile fasciculate branched panicles up to 15 cm. long; rhachises quadrangular; branches dichotomous, ending in dichasia; pedicels stout, up to 3 mm. long; buds oblong, up to 5 mm. long. *Perianth*-tube funnel-shaped, 1—1.5 mm. long, thick-walled, pubescent within; lobes ovate-oblong, 3.5—4 mm. long, also pubescent within, the mouth nearly closed. *Stamens* 2 mm. long, the filaments broad villous, the anthers elliptic; those of the

1st and 2nd rows rather larger than those of the 3rd row, the upper cells small; those of the 3rd row bearing a little above the base two large cordate or sagittate glabrous glands; staminodes of the 4th row slender, 1.25 mm. long, the stalk villous, the tip cordate, glabrous. *Ovary* ovoid nearly glabrous; style rather thick, twisted; stigma with 2—3 recurved lobes. *Fruit* subglobose, slightly compressed laterally, about 25 mm. in diam.; pericarp thick, fleshy, the lower half immersed in a thick cupule formed by the enlarged perianth-tube; embryo globose, 15 mm. in diam. Blume Rumph. I. 42, t. 19; Meissn. in DC. Prodr. XV. 1. 10; Hook. f. Fl. Br. Ind. V. 130; Koord. & Val. Bijdr. X. 73. *C. sulphuratum*, Nees in Wall. Pl. As. Rar. II. 74, and Syst. Laur. 55 *in part*; Miq. Fl. Ind. Bat. I. i. 891.

SINGAPORE: at Changi, Ung Mokio, Bukit Timah and Garden jungle, Ridley 6453!, 8101!, 15621!; Caniley 22!; Walker 29!.
DISTRIB: Java, Borneo (*Teysmann* 8687).

Ridley says flowers of this beautiful plant are very rare; only one of his specimens, without number or locality, possesses them. The description of the fruit is taken from Koorders and Valetton.

10. CINNAMOMUM MOLLISSIMUM, Hook. f. in Fl. Br. Ind. V. 131 (1886). A large evergreenshrub or small tree reaching 10—12 m. in height and 20—30 cm. in diam. of stem, very aromatic; branchlets slender, subquadrangular, brown, lenticellate, puberulous, the uppermost and innovations densely villous with pale golden-brown spreading hairs as are the ovate leaf-buds, 5 mm. long. *Leaves* chartaceous to coriaceous, opposite or subopposite, frequently bullate; elliptic, elliptic-oblong or -lanceolate, attenuately long acuminate at apex and often sphacelate, acute or somewhat rounded at base; upper surface pale green, glabrous except on the ribs of young leaves, lower greyish-villous, ultimately nearly glabrous; margins reflexed; 10—25 cm. long, 2.5—10 cm. broad; ribs three, deeply impressed above, the outer pair from a little (3—7 mm.) above the base, regularly curved almost or quite to the apex; nerves outside these 4—6 on each side obliquely curving to and along the margin and joined in small loops; transverse nervules distant, irregular, branching; reticulation only conspicuous when young; petiole stout, densely villous, 10—15 mm. long, channelled above. *Flowers* cream-coloured, small, in few-flowered long-peduncled densely golden-villous panicles 5—10 cm. long; peduncles at least two-thirds of the length; branches very few, ending in small 7-flowered dichasia; bracts minute, lanceolate; pedicels short; buds globose, grey-

pubescent. *Perianth*-tube campanulate, 2—3 mm. long, white-puberulous within; lobes ovate, acute, 2·3—3 mm. long, the outer very slightly the longer, densely golden-villous within, enlarged and thickened in fruit as is the pedicel. *Stamens* with broad villous filaments; those of the 1st and 2nd rows 1·5—2 mm. long, with oblong anthers and large lower cells, the tip subapiculate; those of the 3rd row as long with narrower anthers, the lower cells opening more or less laterally, the glands obtuse at apex, unequally cordate or sagittate at base, shortly stipitate, attached at the middle of the filaments; staminodes of the 3rd row cordate, glabrous on the inner, villous on the outer side, 1·25 mm. long. *Ovary* ovoid, sparsely pubescent, attenuate into a thick style; stigma obliquely peltate. *Fruit* ovoid, glabrous, black when dry, obtuse at apex, 1—1·5 cm. long, .75 cm. broad, seated on the enlarged thickened calyx-tube which is strongly keeled and glabrescent.

PENANG: at West Hill, *Curtis* 308!. PERAK: at Thaipeng, *Wray* 2669!; in open forest at Larút up to 250 m. alt. *King's Collector* 5568!, 6013!.

11. CINNAMOMUM SCORTECHINII, Gamble in Kew Bull. 219 (1910). An evergreen tree with thin dark brown fairly smooth bark; branchlets dark brown, terete, the uppermost subquadrangular ferruginous-tomentose; leaf-buds ovoid, densely grey-tomentose. *Leaves* coriaceous, opposite or subopposite; elliptic or elliptic-lanceolate, acute or shortly and obtusely acuminate at apex, somewhat attenuate or rounded at base; upper surface glabrous except on the ribs, lower densely greyish-tawny tomentose; margins reflexed; 7—12 cm. long, 2·5—5 cm. broad; ribs 3, impressed above, the side pair branching from the midrib at from 5—7 mm. above its base, not always opposite, curved upwards to end a little below the apex; nerves outside the side ribs about 3—5 on either side, curved obliquely to the margin and joining in loops; transverse nervules subparallel, slightly arched, in old leaves very indistinct as is the reticulation; petiole stout, tawny-tomentose, 10—15 mm. long. *Flowers* rather large, in few-flowered tawny-pubescent axillary panicles up to 7 cm. long; peduncle slender; branches short bearing a pair of 3-flowered dichasia; pedicels short, about 2 mm. long; buds globose. *Perianth*-tube short, scarcely 2 mm. long, glabrous within; lobes ovate, acute, densely tawny villous within, 2—3 mm. long, the outer slightly the longer. *Stamens* rather thick, with broad pubescent filaments; those of the

1st and 2nd row spatulate, 2—2.5 mm. long, the anther cells large, scarcely overlapping; those of the 3rd row with narrow anthers, the cells opening more or less sideways, the 2 reniform glabrous glands sessile about half-way up the filaments; staminodes of the 4th row sagittate, 1.5—2 mm. long, broadly pubescent-stipitate. *Ovary* obovoid, villous, rounded at top; style rather thick, villous; stigma peltate. *Fruit* (immature) an ovoid berry seated on the persistent cupshaped perianth-tube, truncate at the mouth.

PERAK: at camp on Ulu Batang Padang at 1500 m. alt. *Wray* 1520!; *Scortechini* 322!.

Wray's specimens have rather thicker and smaller leaves than Scortechini's and are grey while the latter are reddish but they agree in shape, nervation and pubescence; the difference being probably only due to difference of level.

12. CINNAMOMUM AUREO-FULVUM, Gamble in Kew Bull. 220 (1910). A bush; the branchlets slender, uppermost angular, densely golden-tawny-pubescent as are the innovations. *Leaves* subcoriaceous subopposite; elliptic-lanceolate, attenuately long-acuminate at apex, acuminate at base; upper surface dull, softly appressed grey-pubescent, lower densely golden-tawny-pubescent; 6—8 cm. long, 1.5—3 cm. broad; 3-ribbed from about 3—5 mm. above the base, the midrib reaching to the tip of the acumen, the side ribs scarcely to its base; transverse nervules subparallel, arched, obscure because hidden in the pubescence; petiole slender, 1.5—2.5 cm. long, densely pubescent. *Flowers* in slender tawny-pubescent peduncled dichasia from the axils of upper leaves and up to 4 cm. long; peduncle about 3 cm. long; branches about 1 cm., flattened; bracts caducous; pedicels 2 mm. long; buds ovoid. *Perianth*-tube campanulate, 1 mm. long, articulate with the oblong rounded 2 mm. long subequal lobes, all tawny-pubescent. *Stamens* small, 1.5—2 mm. long; filaments broad, villous; anthers ovate, the upper cells very small, those of the 3rd row bearing half-way up the filaments a pair of rather large reniform glabrous glands; staminodes of the 4th row 1.25 mm. long, the tip cordate, the stalk pubescent. *Ovary* subglobose, wrinkled, sparsely hispid; style slender; stigma acute. *Fruit* not known.

SELANGOR: at Hulu Semangko, on top of the hill, *Ridley* (?) 12103!, 15598!.

13. CINNAMOMUM CINEREUM, Gamble in Kew Bull. 220 (1910). A tree reaching 15—20 m. in height and the stem with a diameter of 40—

50 cm.; branches spreading; branchlets slender, terete, glaucous-grey. *Leaves* sub-coriaceous, undulate, opposite or sub-opposite; lanceolate, acute at apex, subcuneate at base; both surfaces glabrous, the upper shining dark green when fresh, olive green when dry, the lower grey-cinereous as are the young leaves on both sides; margins cartilaginous; 8–15 cm. long, 3–5 cm. broad; ribs 3, the midrib slender in young, strong in old leaves, the side pair branching from the midrib at from 5 to 15 mm. above the base, sometimes not quite opposite, curving to about $\frac{2}{3}$ of the length of the blade and then joined by the main nerves and breaking up into loops; main nerves from the midrib about 4–6 pairs, rather obscure; reticulation prominently areolate in young leaves, hardly apparent in old ones; petiole rather stout, 1–1.5 cm. long, channelled above. *Flowers* pale yellow, in slender long-peduncled grey-pruinose panicles or 7- or 15-flowered dichasia, reaching 15 cm. in length; peduncles very slender, somewhat flattened as are the branches and pedicels; buds obovoid, very minutely puberulous. *Perianth*-tube rather slender, 2 mm. long glabrous within; lobes ovate, 2.5 mm. long, white-villous within specially at the base. *Stamens* slender, 2–2.5 mm. long; those of the 1st and 2nd rows with oblong anthers and anther-cells and nearly glabrous filaments; those of the 3rd row with smaller anthers, filaments villous at base and 2 large uniform glabrous stipitate glands, truncate or lobed at apex, inserted about $\frac{1}{3}$ of the way up the filaments staminodes of 4th row 1.5 mm. long with ovoid acute heads and villous filaments. *Ovary* ovate-oblong, narrowed into the slender style; stigma peltate, oblique. *Fruit* not known.

PERAK: at Waterfall Hill at about 360 m. alt., Wray 2629!; in dense jungle near mountain streams at 300–450 m. alt. near Thaiping, King's Collector 8515!.

14. CINNAMOMUM INUNCTUM, Meissn. in DC. Prodr. XV. 1. 25 (1864). A tree; branchlets slender, black when dry; leaf-buds lanceolate, glabrous. *Leaves* membranous or chartaceous, alternate or sub-opposite; ovate or elliptic, obtuse or bluntly acuminate at apex, rounded or attenuate, usually unequally, at base; both surfaces pale when dry, glabrous; 5–11 cm. long, 3–5 cm. broad; midrib slender, prominent beneath; main nerves faint, 6–9 pairs, the lowest pair frequently opposite and curved to more than halfway up, the rest joining near the margin in small loops, the axils usually bearing a pitted gland; reticulation minutely areolate, prominent under the lens; petiole slender, 1–2.5 cm. long. *Flowers* small, up

to 10 mm. broad when open, in slender few-flowered axillary or lateral glabrous panicles up to 8 cm. long; peduncles slender or filiform; branches sub-opposite, subumbellate; pedicels slender, 5 mm. long. *Perianth*-tube funnel-shaped, short, glabrous within; lobes ovate-oblong, obtuse, up to 2 mm. long, white-villous within, deciduous after flowering. *Stamens* very small; the lower anther cells elliptic, the upper usually circular; those of the 1st and 2nd rows .75—1.25 mm. long, the anthers obtuse, the filaments slender, villous; those of the 3rd row similar and with a pair of reniform subsessile glands close to the base outside the filaments; staminodes of the 4th row cuneiform, stipitate. *Ovary* ovoid; style rather thick, curved; stigma peltate. *Fruit* an ovate berry the size of a pea, seated on a funnel-shaped cupule (Meissn.). Kurz For. Fl. II. 289; Hook. f. Fl. Br. Ind. V. 135. *Camphora inuncta*, Nees in Wall. Pl. As. Rar. III. 32 and Syst. Laur. 89; Miq. Fl. Ind. Bat. I. 1. 905. *Tetranthera camphoracea*, Wall. M.S.

MALACCA (?): Griffith K.D. 4256 !; Maingay K.D. 1244 !.—DISTRIB. Burma (Tavoy).

15. CINNAMOMUM PARTHENOXYLON, Meissn. in DC. Prodr. XV. i. 26 (1864). A very large tree with straight trunk reaching 30 to 45 m. in height and a diameter of 1 m. and perhaps more; branches spreading; branchlets moderately thick, nearly black when dry, the uppermost angular, glabrous; leaf-buds lanceolate, inflorescence buds with large silky-pubescent deciduous scales. *Leaves* very variable in shape and texture, young ones thin, red when first open, the old ones subcoriaceous, alternate; elliptic or elliptic-ovate or -obovate, sometimes lanceolate, acute or acuminate at apex, acute or rounded and usually unequal at base; both surfaces glabrous, the upper dull or slightly shining, the lower more or less glaucous; 6—12 cm. long, 3—6 cm. broad: midrib slender, not prominent; main nerves very irregular, about 6 to 8 pairs, not prominent, curving upwards to join in rather obscure loops near the margin; no glands in the nerve axils; reticulation areolate; petiole slender, 2—3 cm. long, usually channelled above. *Flowers* small, 10 mm. broad when open, light yellow, in lax slender axillary or lateral panicles up to 8 cm. long; peduncles and pedicels filiform, glabrous or the latter puberulous. *Perianth*-tube funnel-shaped, glabrous within; lobes elliptic-oblong, obtuse, nearly glabrous without, villous within, 2—2.5 mm. long, deciduous after flowering. *Stamens* minute, the anthers with nearly circular pores; those of the 1st and 2nd rows

with nearly orbicular anthers and short slightly villous filaments, .75 mm. long; those of the 3rd row 1.25 mm. long, very obtuse, with 2 large reniform subsessile glands attached near the base outside the villous filaments; staminodes of the 4th row cuneiform or sagittate, stipitate, villous outside, 1 mm. long. Ovary ovoid, glabrous; style short; stigma large, peltate. Fruit a globose berry about 7 mm. in diam. seated on the truncate spreading cup-shaped enlarged perianth-tube, the fruiting pedicel long-funnel-shaped; exocarp thick, succulent, dark purple; endocarp crustaceous. Seed spherical; testa membranous; cotyledons hemispherical, enclosing the minute radicle. Kurz For. Fl. II. 289; Hook. f. Fl. Br. Ind. V. 135; Koord. & Val. Bijdr. XI. 82. *C. pseudo-Sassafras*, Meissn. l. c. 27. *C. ? malaccense*, Meissn. l. c. 27. *C. Neesianum*, Meissn. l. c. 26. *Parthenoxylon porrectum*, *pseudo-Sassafras* and *pruinatum*, Blume in Mus. Bot. Lugd.-Bat. I. 323; Miq. Fl. Ind. Bat. I. 1. 967. *Camphora Parthenoxylon*, Nees in Wall. Pl. As. Rar. II. 76; Benth. Fl. Hongk. 290. *C. pseudo-Sassafras*, Miq. in Zoll. Cat. 113, 114. *C. chinensis*, Nees Syst. Laur. 92. *Sassafras Parthenoxylon*, Nees Syst. Laur. 491; Wight Ic. t. 1832 (copied from Roxb.). *Persea pseudo-Sassafras*, Zoll. in Nat. Gen. Arch. II. 635. *Laurus Parthenoxylon*, Jack in Mal. Misc. I. 28; Wall. Cat. 2602. *L. pseudo-Sassafras*, Bl. Bijdr. 573. *L. porrecta*, Roxb. Fl. Ind. II. 308. *Phœbe latifolia*, Champ. in Kew Journ. Bot. V. 197.

PENANG: Wallich 2602!; Curtis 512!, 1038!, 1406!; J. Scott.!; King's Collector 1456!. PROVINCE WELLESLEY: at Tasik Glugor, Ridley 6968!, 12585!. DINDINGS: at Pangkore, Ridley 8377!. PERAK: at Lumut Dindings, Ridley 3044!; at Kinta and Gunong Bubu, King's Collector 7120!, 8354!; at lower camp, Gunong Batu Pateh, Wray 1072!. MALACCA: Maingay K.D. 1244!, 1512!. DISTRIB. Burma, Java, Sumatra, China.

In Herb. Singapore is a sheet collected by F. Dennys at Gunong Menkong Labar in the Federated States. The specimen has no flowers or fruit but the leaves are remarkable for being very thick. Leaves opposite or subopposite, very coriaceous; ovate, obtusely acuminate at apex, rounded at base and slightly decurrent; glabrous and shining on both surfaces; margins flat; ribs 3, flat, with a slender quite basal additional pair close to the margin and soon forming a looped intramarginal nerve; the inner ribs alongside the midrib for about 1 cm. then leaving it to curve upwards to about $\frac{2}{3}$ of the length of the blade when they meet the first main nerves and break into loops; main nerves from midrib 3—4 pairs, faint, below them prominent not parallel transverse nervules; outside the ribs 6 or more outer nerves, short, meeting the intramarginal one; reticulation prominent, beautifully areolate; length

10—15 cm., breadth 5—8 cm.; petiole very stout 1—1.5 cm. long, bordered above by the decurrent margins of the blade. It seems to belong to *Cinnamomum*; but in the absence of flower and fruit this is not quite certain.

7. ALSEODAPHNE, Nees.

Evergreen trees. *Leaves* alternate, often subverticillate or fascicled at the ends of the branchlets, penninerved. *Flowers* small, hermaphrodite, in axillary or subterminal panicles, the cymules of the branches often subumbellate. *Perianth*-tube short, continuous with the pedicel; lobes 6, subequal, the outer ones often slightly the smaller. *Stamens* 9 fertile, with 4-celled ovate-oblong anthers; those of the 1st row opposite the outer perianth lobes, and introrse; those of the 2nd row opposite the inner perianth-lobes also introrse; those of the 3rd row opposite those of the 1st row, extrorse, and with two usually large glabrous glands at the base a little behind; staminodes of the 4th row opposite the stamens of the 2nd row, large, glabrous on the inner side, stipitate, ovate or cordate. *Ovary* ovoid or globose, 1-celled, 1-ovuled; style rather slender; stigma peltate. *Fruit* an ellipsoid or globose berry, seated on the enlarged perianth-tube and usually persistent lobes and supported by the enlarged often red and warted pedicel (as in *Dehaasia*).—DISTRIB. India, China, Malay Islands and Peninsula, about 12 species.

Third row of stamens with glands distinct from the filaments, at their base.

Leaves membranous

- | | |
|---|-----------------------------|
| Flowers in glabrous panicles, minute; berry ellipsoid 2.5 cm. long | 1. <i>A. peduncularis</i> . |
| Flowers in grey-puberulous panicles, larger; berry globose 1.5 cm. long | 2. <i>A. Wrayi</i> . |

Leaves coriaceous

- | | |
|---|---------------------------|
| Drupe globose under 1.5 cm. in diameter; leaves under 12 cm. in length | 3. <i>A. bancana</i> . |
| Drupe oblong-ellipsoid, 4—5 cm. long, 2 cm. in diam.; leaves over 20 cm. long | 4. <i>A. petiolaris</i> . |
| Leaves very coriaceous, rarely under 15 cm. in length | |
| Berry dull, black, ellipsoid, about 2 cm. long and 1 cm. broad | 5. <i>A. paludosa</i> . |
| Berry shining, brown, oblong-ellipsoid, 3.5 cm. long and 2 cm. broad, seated on the prominent enlarged perianth-tube, the lobes deciduous | 6. <i>A. insignis</i> . |

- Berry pale brown, very scurfy and pustular, oblong-ellipsoid, 7—8 cm. long and about 4 cm. in diameter; perianth-tube not enlarged in a ring, its lobes persistent
- 3rd row of stamens with glands attached to the filaments above the base: leaves sub-membranous, pendulous, large; panicles subracemose with distant branches and few flowers 8. *A. pendulifolia*.
- Species imperfectly known* 9. *A. crassipes*.
7. *A. Ridleyi*.

1. *ALSEODAPHNE PEDUNCULARIS*, Hook. f. in Fl. Br. Ind. V. 144 (1886). A shrub or small tree, reaching 3 to 4.5 m. in height; branchlets white, slender, uppermost nearly black when dry; leaf-buds lanceolate, 5—6 mm. long, black when dry, with few scales. *Leaves* membranous, more or less fascicled at the ends of the branchlets; elliptic-lanceolate, obtusely subcaudate, acuminate at apex, acutely attenuate or cuneate at base; both surfaces glabrous, dark olive-green when dry; 10—20 cm. long, 3—7 cm. broad; midrib slender, raised on both surfaces; main nerves 6 to 10 pairs, slightly curved for about two-thirds of the distance to the margin and then joined by broad loops, prominent and pale beneath; transverse nervules few, irregular, easily visible beneath; petiole slender, 5—10 cm. long. *Flowers* minute, greenish yellow, in slender nearly glabrous pedunculate panicles from the axils of the uppermost leaves, 3—7 cm. long; peduncles subfiliform up to 4 cm. long; branches very slender ending in umbellate cymes of about 3—6 flowers; bracts subulate, bracteoles minute; pedicels subclavate; buds globose. *Perianth*-tube short; lobes nearly equal, ovate, 1—1.5 mm. long, glabrous without, puberulous within. *Stamens* very short, hairy, those of 1st and 2nd rows .75 mm. long with very short villous filaments; those of 3rd row similar but longer and with 2 ovate glabrous villously stipitate .5 mm. long glands at the base or a little behind; staminodes of the 4th row reniform, glabrous except on the back and for a villous tuft at base. *Ovary* globose, slightly villous; style thick, curved; stigma broadly peltate. *Fruit* an ellipsoid berry, 2.5 cm. long, 1.5 cm. in diameter, supported on the persistent perianth lobes and the much thickened cylindric straight or curved red pedicel, 2.4 cm. long; pericarp black when ripe, smooth. *Haasia peduncularis*, Nees Syst. Laur. 376; Meissn. in DC. Prodr. XV. I. 61; Miq. Fl. Ind. Bat. I. i. 930. *Machilus peduncularis*, Nees in Wall. Pl. As. Rar. II. 70. *Persea peduncularis*, Nees Syst. Laur. 125 (excl. syn. *Rumph.*). *Laurus peduncularis*, Wall. Cat. 2596.

PENANG: *Wallich* 2596!. PERAK: *Wray* 3632!, 3683!, 3792!; *Scortechini* 536!; near Ulu Kerling and Ulu Selangor at 120 to 240 m. alt., *King's Collector* 7916!, 8632!, 8836!. SELANGOR: at Labu and Petaling, *Ridley* 7622!, 8492!; at Kwala Lumpur, *Mohamed* 1908!

2. *ALSEODAPHNE WRAYI*, Gamble in Kew Bull. 220 (1910). A tree, reaching 30 m. in height and a considerable girth; branchlets rather slender with greyish-white bark; leaf-buds lanceolate acuminate nearly 1 cm. long, black, with few scales. *Leaves* membranous, somewhat clustered at the ends of the branchlets; elliptic-lanceolate, obtusely rather long acuminate at apex, narrowed at base; upper surface glabrous, dull, olive-brown when dry, lower minutely puberulous and punctate finally glabrous; 7—12 cm. long, 3—5 cm. broad; midrib slender, slightly impressed and keeled above, raised beneath; main nerves 10—12 pairs raised beneath, rather irregular and usually oblique, curving to branch and meet near the margin in irregular loops; transverse nervules and reticulation clear but not prominent; petiole 1—1.5 cm. long, channelled above. *Flowers* pale green, about 5 mm. in diam. in pedunculate branching slender grey-puberulous panicles from the upper leaf-axils, about as long as the leaves and reaching 10 cm. in length and 5 cm. in breadth; peduncles slender, 4 to 5 cm. long; branch peduncles also slender, cymules 3—5-flowered; pedicels very slender, somewhat clavate, about 7 mm. long; bracts ovate, caducous; bracteoles minute, triangular; buds globose. *Perianth*-tube short, cup-shaped; lobes subequal or the outer very slightly the shorter, up to 2 mm. long, puberulous within as without. *Stamens* of 1st and 2nd rows slender, clavate, 2 mm. long, the filaments and connective villous; stamens of 3rd row as long but more slender and the 2 upper anther-cells very inconspicuous, glands at the base ovoid glabrous rather large; staminodes of 4th row oblong, glabrous except the tuft of hair at the base, about as large as the glands. *Ovary* ovoid, glabrous; style slender; stigma peltate. *Fruit* a globose or slightly ellipsoid berry 1.5 cm. in diam., seated on the persistent reflexed perianth and a clavate subtrigonus enlarged fleshy pedicel 2 cm. long; pericarp black, shining, thin; embryo depressed at apex.

PERAK: at Kota, *Wray* 2543!; in forest near Larut, *King's Collector* 5493!, 5917!

The leaves of this species resemble those of *A. peduncularis*, but the flowers are larger and different in many respects.

3. *ALSEODAPHNE BANCANA*, Miq. Fl. Ind. Bat. I. i. 915 (1855). *Tree* (?); branchlets moderately thick, greyish-brown, lenticellate uppermost more slender; leaf-buds ovate acute, with few shining whitish scales. *Leaves* coriaceous, usually fasciated at the ends of the branchlets; obovate, shortly obtusely acuminate at apex, cuneate at base; both surfaces glabrous, upper dark olive-green to black when dry, lower dull and somewhat reddish puberulous when young; margins slightly recurved; 10–20 cm. long, 5–9 cm. broad; midrib stout, prominent and raised on both surfaces; main nerves 10–12 pairs, the lowest faint, impressed above, raised beneath, at first nearly straight then curving upwards to meet at about 5 mm. from the margin in prominent loops; transverse nervules few, parallel; reticulation obscure; petiole stout, much wrinkled, 10–15 mm. long, bordered by the decurrent margins of the blade. *Flowers* very small, in slender subracemose panicles from the uppermost axils, about as long as the leaves; peduncles slender, 5–8 cm. long; branches short; cymules 3–5-flowered; pedicels slender, 4–5 mm. long; buds globose, 2 mm. in diam. *Perianth*-tube short, lobes subequal, the outer rather shorter than the inner, puberulous, obovate, obtuse. *Stamens* very minute; those of 1st and 2nd rows with nearly orbicular anthers and short broad pubescent filaments, .75 mm. long; those of 3rd row rather longer and narrower, the glands at their base large, white, glabrous; staminodes of 4th row ovate, acute, glabrous without, hairy at back, 5 mm. long. *Ovary* rounded; style short, thick; stigma peltate. *Fruit* a globose berry 1.5 cm. in diameter, seated on the persistent perianth lobes and a not much thickened warty enlarged pedicel; pericarp black, smooth, rather thin. Meissn. in DC. Prodr. XI. i. 28. *A. decipiens*, Hook. f. Fl. Br. Ind. V. 145.

SINGAPORE: Garden jungle and Bukit Timah, *Ridley*, 3369!, 4937!; at Chanchukang, *Ridley* 6156!, 6160!—DISTRIB. Bangka, (*Horsfield*!, *Kurz*!), Borneo (*Haviland* 3086!).

4. *ALSEODAPHNE PETIOLARIS*, Hook. f. in Fl. Br. Ind. V. 145 (1886). A large tree; branchlets subverticillate, very stout, lenticellate, dark brown, scurfy; buds short, conical. *Leaves* coriaceous; oblong or oblong-obovate, abruptly and sharply caudate-acuminate at apex, attenuate to nearly rounded at base: both sur-

faces glabrous, dark brown when dry, reticulate; margins slightly recurved; 20—30 cm. long, 12—18 cm. broad; midrib stout, impressed above, much raised beneath; main nerves 8—12 pairs, at first straight then curved to join in loops near the margin; transverse nervules many, prominent, enclosing the much netted reticulation, all the nerves and nervules raised on both surfaces; petiole very stout, 3—6 cm. long. *Flowers* in stout panicles reaching 20—30 cm. in length from the axils of the upper leaves, the branches rusty-puberulous, ascending; pedicels short, gradually thickening; bracts minute, caducous. *Perianth*-tube funnel-shaped, 1—1.5 mm. long; lobes subequal, 2.5 mm. long, rusty-puberulous without. *Stamens* short, nearly glabrous or only with sparse rusty hairs on the filaments, those of the 1st and 2nd rows obtuse, 1.5 mm. long; those of the 3rd row 2 mm. long with a pair of large glabrous glands at the base behind; staminodes of the 4th row ovate, small, sometimes 0. *Ovary* ovoid; style thick, puberulous; stigma large, capitate. *Fruit* an oblong-ellipsoid drupe 4—5 cm. long, 2 cm. in diam., the pericarp black when dry, supported on the persistent perianth-lobes, the pedicels thickened only to about 3 mm. in diam., rugose and scurfy. *Nothaphæbe*? *petiolaris*, Meissn. in DC. Prodr. XV. 1. 59.

PAHANG: at Telom, *Ridley* 13782!—DISTRIB. India (Assam), Burma.

5. *ALSEODAPHNE PALUDOSA*, Gamble in Kew Bull. 221 (1910). A very large tree reaching 24—30 m. in height and about 1 m. in diameter of stem; branchlets very stout, rough, dark grey; leaf-buds conical, glabrous, about 5 mm. long, with many outer scales. *Leaves* very coriaceous, fascicled at the ends of the branchlets; obovate, obtuse or rather deeply emarginate at apex, long-cuneate at base; upper surface glabrous shining, lower glaucous; margins recurved; 20—25 cm. long, 7—9 cm. broad; midrib very stout, slightly raised above and prominently channelled, nearly flat beneath; main nerves 15 to 17 pairs, rather faint, impressed above, slightly raised beneath, lower ones at about 50° with the midrib, upper at 70°, only curved near the margin or hardly looped; transverse nervules few, irregular, not visible on the upper surface; reticulation minutely areolate, indistinct beneath, invisible above; petiole stout, 3—4 cm. long, bordered by the decurrent margins of the blade. *Flowers* imperfectly known; fruiting inflorescence of racemose panicles from the uppermost axils reaching 10—15 cm. in length; peduncles and rhachis prominently warted; enlarged pedi-

cels obconic, slightly flattened, glaucous and much warted, 2—3 cm. long, surmounted by the prominently persistent perianth-lobes and stamens. *Perianth-lobes* triangular, 5 mm. long and glabrous in fruit, the outer ones slightly the smaller. *Stamens* in fruit very slender, clavate, glabrous; those of 1st and 2nd rows 3 mm. long; those of 3rd row 4 mm. long and with 2 rather large rounded glands; staminodes of 4th row cordate, glabrous, stipitate. *Fruit* (young) an oblong ellipsoid berry about 2 cm. long and 1 cm. in diam., the top depressed; pericarp tough, dull, black when dry.

PERAK: in dense jungle on low wet ground in Larut, *King's Collector* 5378!

This species is very near *A. insignis* and agrees with it very closely in the leaves, but in this the nerves are impressed while in that they are raised; the midrib also differs; while *insignis* seems only to have the apex sometimes slightly emarginate. The fruit of *insignis* has a prominent annular ring and the perianth-lobes which are not very persistent are quite small, while in *paludosa* there is no ring and the lobes are large and prominent.

6. *ALSEODAPHNE INSIGNIS*, Gamble in Kew Bull. 221 (1910). A very large tree reaching 24 to 30 m. in height and about 1 m. in diam. of stem; branchlets very stout, dark brown; leaf-buds conical, about 5 mm. long, with few lanceolate glabrous scales. *Leaves* very coriaceous, fascicled at the ends of the branchlets; oblong or obovate or oblanceolate, rounded or very obtusely acute at apex, cuneate or attenuate, often somewhat decurrent at base; both surfaces glabrous, the upper shining, the lower bluish-green; margins thickened; size variable from 12—15 cm. by 5—7 cm. and somewhat rounded at base, to 15—35 cm. by 5—10 cm. and narrowed at base; midrib very stout, prominent, raised on both surfaces; main nerves 12—15 pairs slightly raised on both surfaces, starting at about 70° with the midrib and curved nearly to the margin where they join in loops; not prominent on the upper, but very evident on the lower surface, joined by rather inconspicuous transverse nervules and a minutely netted reticulation; petiole stout, 3—6 cm. long, channelled above by the continuation of the margins of the blade. *Flowers* light green with yellow stamens, in subterminal, erect, stout, minutely puberulous panicles reaching 15 cm. in length; peduncles and rhachis angular, nearly black; branches short, tawny-puberulous, subumbellate; bracts small, ovate-lanceolate, caducous; pedicels stout, trigonous; buds clavate; fruiting panicles from the uppermost leaf-axils 10—30 cm. long; peduncles in fruit very stout. *Perianth-lobes* puberulous, the outer

3 shorter than the inner 3 which are 2.5—3 mm. long and ovate. *Stamens* rather slender, those of the 1st and 2nd rows 2 mm. long, clavate; those of 3rd row similar but larger, and with 2 rather large glabrous glands at the base; staminodes of 4th row ovate-cordate, glabrous on the inner, villous on the outer face and on the short stalk, 1—1.5 mm. long. *Fruit* shining, glabrous, bright green, chestnut brown when dry, oblong-ellipsoid, obtuse, reaching 3.5 cm. in length and 2 cm. in diam.; seated on the much enlarged perianth-tube which then assumes the form of an annular flattened disk nearly 2 cm. in diam., this again is supported by the clavate, flattened or trigonous, enlarged pedicel 2 cm. long, green mottled with brown spots when fresh, glaucescent and prominently warted when dry.

PERAK: near Larut in dense forest up to 300 m. alt., *King's Collector* 6608!, 6958!, 7273!, 8451!

7. *ALSEODAPHNE RIDLEYI*, Gamble in Kew Bull. 222 (1910). A medium-sized tree; branchlets very stout, light brown, lenticellate; leaf-buds short, with many scales. *Leaves* very coriaceous, clustered at the ends of the branchlets; elliptic-oblong or -obovate, often unequal-sided, obtuse or very minutely apiculate at apex, rounded or attenuate at base; both surfaces glabrous, the upper shining, the lower glaucous; 13—25 cm. long, 5—13 cm. broad; midrib very stout, flattened above or slightly raised, raised beneath; main nerves 12 to 15 pairs, irregular, at from 60° to 70° with the midrib, curving to and along the margin but scarcely looped, very slightly raised above, more so beneath, joined by irregular transverse nervules and an areolate reticulation hardly visible above but more prominent beneath; petiole very stout, enlarged and wrinkled at base, 2—4 cm. long, upper part bordered by the decurrent blade-margins. *Flowers* in glabrous panicles from the upper leaf axils, the panicles reaching 10 cm. long and 5 cm. broad; peduncle rather short, flattened; branches few, 3-chotomous; bracts ovate acute 2—3 cm. long; cymules few-flowered; pedicels clavate, enormously thickened in fruit as is the rhachis; buds globose. *Perianth*-tube short; lobes ovate, the outer slightly smaller. *Stamens* very small, clavate, rounded; glands of 3rd series ovoid; staminodes of 4th series ovate, glabrous. *Fruit* a very large oblong ellipsoid berry with depressed top, 7—8 cm. long and about 4 cm. in diameter, seated on the much thickened pedicel which is often 1—5 cm. thick at top; pericarp 3—5 mm. thick, densely covered as are the enlarged rhachis and pedicel with tawny-brown scurf and raised pustules.

SELANGOR: at 15th mile Pahang track at about 300 m. alt., Ridley 8532!

8. *ALSEODAPHNE PENDULIFOLIA*, Gamble in Kew Bull. 222 (1910). A tree, reaching a height of 12 to 18 m. and a diameter of stem of 20—40 cm.; branchlets very stout, at least 10 mm. in diam. at apex, scarred and wrinkled; leaf-buds ovoid, glabrous, 5 mm. long, with spreading scales. *Leaves* sub-membranous, fascicled at the ends of the branchlets and 'hanging downwards in the shape of an umbrella' (*King's Collector*); obovate or oblanceolate, obtuse or very shortly acuminate at apex, long cuneate at base; both surfaces dull, reddish-brown when dry, the lower paler, glabrous; 17—35 cm. long, 5—11 cm. broad; midrib slender, little raised on either surface; main nerves 15 to 20 pairs, slender, curving upwards to and along the margin, joined by many rather irregular transverse nervules and then again by an irregularly areolate reticulation, prominent under the lens especially beneath; petiole slender, curved, 2—4 cm. long, bordered above by the decurrent margins of the blade. *Flowers* pale yellow, about 5 mm. broad when open; in long, very lax glabrous subracemose panicles from the axils of the fascicled leaves, and nearly as long as the leaves; peduncle rhachis and branches somewhat flattened, black when dry; branches slender, few-flowered, ending in 3-flowered umbels; pedicels slender, clavate at tip, 7 mm. long; buds glabrous, obconic. *Perianth*-tube funnel-shaped, thick; lobes ovate acute, the outer 1 mm. the inner 2 mm. long, sparsely silky within. *Stamens* 1.5—2 mm. long, with the anther-cells unequal, the upper pair very small; those of the 1st and 2nd rows with ovate anthers and broad puberulous filaments; those of the 3rd row with oblong anthers, the upper cells minute, the filaments puberulous, and the 2 reniform glabrous large glands subsessile a little above the broad filament base; staminodes of 4th row cordate, glabrous, broadly stipitate. *Ovary* ovoid, attenuate into the short style; stigma small, obtuse. *Fruit* (very immature) a globose glabrous drupe seated on the enlarged perianth and its enlarged pedicel.

PERAK: in dense forest, chiefly of bamboo, near Ulu Bubong and Ulu Kerling, up to 200 m. alt., *King's Collector* 8785!, 10623!. Without locality, *Burn-Murdoch* in Herb. Singap. Vern. 'Medang Payong'!

Species imperfectly known.

9. *ALSEODAPHNE CRASSIPES*, Hook f. Fl. Br. Ind. V. 146 (1886). A tree?, branchlets stout, woody, with ashy bark, upper-

most and innovations rusty-tomentose. *Leaves* coriaceous, alternate or sub-opposite, falcately recurved; elliptic-lanceolate, acuminate at apex, cuneately narrowed at base; both surfaces glabrous, yellowish when dry, upper shining; 10—13 cm. long, 2.5—4 cm. broad; midrib slender, main nerves 6—8 pairs, raised on both surfaces, at first straight then branching and joining in loops at some distance from the margin; reticulation sparse but prominent; petiole slender, 1.5—2.5 cm. long. *Fruiting peduncles* numerous, 7—10 cm. long, very strict, thickened upwards, as rigid and woody as the branchlets and thicker at the top than the pedicel is broad; pedicels 4—6 mm. long, cylindric, black. *Fruit* smooth, ellipsoid, 15—18 mm. long, 10—12 mm. in diam., dark blue-black, pruinose, with red pedicel.

MALACCA : Maingay K. D. 1261 !

A. ? costalis, Nees in Wall. Pl. As. Rar. II. 72 and Syst. Laur. 185 ; Hook. f. in Fl. Br. Ind. V. 146 seems to be *Litsea robusta*, Bl.

ALSEODAPHNE LUCIDA, Nees in Wall. Pl. As. Rar. II. 72 (1831). "Branches stout, lenticellate. *Leaves* 20—30 cm. long, scattered, very coriaceous, obovate-oblong, acuminate, base obtuse; shining above, paler beneath; nerves 16—20 pairs, spreading, slender; midrib prominent above; reticulations beneath very faint; petiole 2.5—4 cm. long, terete, thickened and rugose at the base." (Description from Fl. Br. Ind.). Syst. Laur. 186; Meissn. in DC. Prodr. XV. i. 29; Hook. f. Fl. Br. Ind. V. 147. *Laurus ? lucida*. Wall. Cat. 2590.

SINGAPORE : Wallich 2590 !

In the Fl. Br. Ind. it is suggested that this is not a Laurineous plant, but it seems not unlike a *Litsea*. The chief characteristic of the leaves is that the main nerves are at first straight and parallel and curve close to the margin.

8. NOTHAPHOEBE, Blume.

Evergreen trees. *Leaves* alternate, not subverticillate but more or less crowded towards the ends of the branchlets, penni-nerved. *Flowers* very small, hermaphrodite, in axillary or subterminal panicles, the cymules of the branches generally subumbellate. *Perianth*-tube very short, continuous with the pedicel; lobes 6, unequal, the 3 outer usually much smaller than the inner. *Stamens* 9 fertile, with 4-celled ovate-oblong very small villous anthers and short filaments; those of the 1st row opposite the outer perianth-

lobes introrse; those of the 2nd row opposite the inner perianth-lobes, also introrse; those of the 3rd row opposite those of the 1st row, extrorse, with 2 small villous rounded glands at the base a little behind the glands sometimes wanting; staminodes of the 4th row opposite the stamens of the 2nd row, very small, ovate or triangular, villous on both sides. *Ovary* ovoid or globose, style slender, stigma peltate. *Fruit* an ellipsoid or oblong-obovoid berry seated on the enlarged perianth-tube and sometimes persistent lobes and supported by the slightly enlarged pedicel.—*DISTRIB.* Malay Islands and Peninsula, about 13 species.

Leaves mostly obovate or oblanceolate, cuneate at base, under 20 cm. long; glands of 3rd row stamens always present.

Leaves without very prominent raised reticulation; flower panicles under 12 cm. long.

Flower-panicles glabrous or only puberulous.

Leaves chartaceous, main nerves
6—8 pairs 1. *N. umbelliflora*.

Leaves membranous, main nerves
8—10 pairs 2. *N. fruticosa*.

Flower-panicles rusty-tomentose (exc. var.
glabrescens); leaves chartaceo-coriaceous 3. *N. Kingiana*.

Leaves with very prominent raised reticulation;
flower-panicles over 15 cm. long .. 4. *N. reticulata*.

Leaves panduriform-obovate, cordate-auriculate at base,
over 20 cm. long; glands of 3rd row stamens absent
or exceedingly minute 5. *N. panduriformis*.

1. *NOTHAPHCEBE UMBELLIFLORA*, Blume in Mus. Bot. Lugd.-Bat. I. 328 (1850). An evergreen tree reaching 15 to 25 m. in height and a considerable girth; branchlets glabrous, slender, white, the uppermost black when dry, innovations rusty-tomentose; leaf-buds lanceolate, very small, rusty-tomentose, with few or no scales. *Leaves* chartaceous; elliptic, obovate or oblanceolate, cuspidate-acuminate at apex, long-cuneate at base rarely almost rounded but always somewhat decurrent; glabrous on both surfaces, the upper dark olive brown, the lower reddish; 8 to 20 cm. long, 3—6 cm. broad; midrib slender, prominent beneath; main nerves 6—8 pairs, sometimes rather more, rather oblique, curved to the margin where they are joined in loops, cross nervules few, irregular, prominent, raised; reticulation obscure; petiole 8—12 mm. long, often curved. *Flowers* minute, in axillary thyrsiform slender puberulous panicles shorter than the leaves and up to 10 cm. long; branches

many, ultimate cymules umbelliform; bracts ovate, tomentose; bracteoles minute; pedicel clavate, 1—2 mm. long; buds globose, about 1 mm. in diam., sub-glabrous; flowers reddish. *Perianth*-lobes very small, ovate; outer 3.5 to 3.75 mm. long, inner three 1—1.25 mm. long, slightly pubescent within. *Stamens* minute, villous with unicellular hairs, those of 1st and 2nd rows .75 mm. long, rounded at top; those of 3rd row similar but slightly larger, with 2 villous rounded glands a little behind them; staminodes of 4th row minute, ovate, densely villous. *Ovary* globose, 5 mm. in diam.; style as long; stigma small, peltate. *Fruit* an oblong obovoid dark purple berry about 4 cm. long and 2 cm. in diam., seated on the persistent perianth tube and lobes and the very slightly thickened pedicels; pericarp smooth, often spotted, rather thin. Meissn. in DC. Prodr. XV. i. 58; Koord. & Val. Bijdr. X. 105. *N. chartacea*, Bl. l.c. fide Koord. & Val. *Ocotea umbellifera*, Blume Bijdr. 573. *Phæbe*? *umbelliflora*, Nees Syst. Laur. 115; Miq. Fl. Ind. Bat. I. i. 911. *P. chartacea*, Miq. l.c. 912. *Haasia nitida*, Meissn. in DC. l.c. 61. *Alseodaphne umbelliflora*, Hook. f. in Fl. Br. Ind. V. 145.

SIAMESE STATES: Tongka, *Curtis* 2933!. PENANG: Batu Ferengy, Waterfall and other places, *Curtis* 1230!, 1536!, 2784!, 3068!. PERAK: in forest near Larut, Thaiping and Goping, *King's Collector* 3437!, 5897!, 6645!, 7490!, 8484!. MALACCA: *Griffith* K.D. 4253; *Maingay* K.D. 1247!, 1247-2!, 2515!; *Derry* 951!; at Selandan, *Goodenough* 1823!. SINGAPORE: at Chanchukang, &c., *Ridley* 1855!, 2888!, 3934!, 4576!, 6267!.—DISTRIB. Java, Sumatra, Borneo.

Vern. 'Medang Linggudi' (*Derry*); 'Kelah putih' (*Goodenough*).

Curtis 3665! from Waterfall, Penang, with oblanceolate glabrous leaves 20 cm. long and an ellipsoid drupe 3 cm. long, the leaves with about 13 pairs of main nerves, seems to belong to a species of *Nothaphæbe* near to *N. umbelliflora*, Blume.

2. *NOTHAPHÆBE FRUTICOSA*, Gamble in Kew Bull. 223 (1910). A shrub reaching 2—2.5 m. in height; branchlets slender, with greyish-white bark, uppermost black when dry; leaf-buds linear-lanceolate, black, glabrous, 5 mm. long. *Leaves* membranous, towards the ends of the branchlets but not crowded; lanceolate or oblanceolate, acuminate at apex, cuneate at base; both surfaces glabrous except the midrib above, olive-brown when dry; 10—15 cm. long, 3—5 cm. broad; midrib slender, slightly keeled above; main nerves 8—10 pairs, irregular, curving upwards and sometimes

branching, to meet in irregular loops well within the margin, scarcely raised above; transverse nervules few, inconspicuous but visible on the lower surface as are the reticulations; petiole slender, 5 to 15 mm. long. *Flowers* minute, 4 mm in diam., in very slender glabrous pedunculate panicles from the axils of upper leaves reaching 7 cm. in length and about 2 cm. in breadth; peduncles filiform as are the branches and pedicels, the latter clavate nearly 3 mm. long; buds globose. *Perianth*-tube very short; lobes ovate, the outer about 1 mm. long, the inner 1.5 mm., all very glandular and nearly glabrous without, puberulous within. *Stamens* of 1st and 2nd rows very small, clavate, villous, 1.5 mm. long; those of 3rd row rather longer with 2 villous rounded glands at the base; staminodes of 4th row ovate obtuse, villous. *Ovary* oblong; style very thick, curved; stigma large, peltate. *Fruit* not known.

PERAK: at Tapa, Wray 182!; at Ulu Bubong and Larut up to nearly 1000 m. alt., King's Collector 5448!, 11029! SELANGOR: at Ulu Selangor, Goodenough!

An obscure species much resembling in leaf *Alseodaphne peduncularis* and Wrayi, but with the flowers of *Nothaphæbe umbelliflora*.

3. NOTHAPHÆBE KINGIANA, Gamble in Kew Bull. 224 (1910). A tree, with spreading branches, reaching 12 to 18 m. in height and 40 to 50 cm. in diameter of stem; branchlets moderately stout, greyish-white, lenticellate; leaf-buds lanceolate, tawny pubescent, with few scales. *Leaves* chartaceo-coriaceous, variable in shape; elliptic or elliptic-obovate or -oblanceolate, obtusely acute to even sharply cuspidate acuminate at apex, cuneate attenuate or slightly rounded at base; upper surface shining, olive-green when dry, minutely punctulate, glabrous except on the midrib, lower reddish-brown glabrous; 10—25 cm. long, 5—9 cm. broad; midrib stout, raised on both surfaces; main nerves 8—11 pairs, starting at 50° to 60° with the midrib and curving to and along the margin, the upper ones joining in prominent loops, slightly impressed above, raised beneath, joined by rather irregular distant transverse nervules, which and the minor reticulations are prominent on both surfaces; petiole stout, 1—3 cm. long, the base often wrinkled, the upper part bordered by the decurrent margins of the blade. *Flowers* reddish or yellowish, small, in rusty-tomentose panicles from the upper leaf-axils, the panicles 10—12 cm. long and about 4 cm. broad; peduncle short; rhachis often flattened, branches short, ending in umbels of 3—6 flowers; bracts very small, ovate, caducous; bracteoles minute; pedicels

clavate, about 5 mm. long. *Perianth*-lobes densely rusty-tomentose without, thick, the 3 outer much shorter than the 3 inner, pubescent within. *Stamens* very small, those of the 1st and 2nd rows villous, scarcely 5 mm. long, filaments short, broad, connective obtuse; those of the 3rd row villous, about .75 mm. long, with 2 minute villous glands at the base; staminodes ovate, villous, very small and inconspicuous. *Ovary* oblong, attenuated into a slender style; stigma large, peltate. *Fruit* an obovoid oblong, often curved, berry 5—7 cm. long by 2 cm. broad, seated on the persistent perianth tube and lobes and somewhat enlarged rugose pedicel; pericarp dark red, spotted, smooth, rather thin, the apex wrinkled.

PERAK: at Waterfall, Thaipeng, etc. *Wray* 2268!, 2701!, 3452!; on low ground near Larut and up to about 800 m. alt., *King's Collector* 1928!, 3182!, 4938!, 6647!, 7295!.

Var. *glabrescens*, Gamble. *Panicles* very short, few-flowered, glabrous, the cymules not prominently subumbellate; glands at the base of the 3rd row stamens often absent. *Leaves* obovate or elliptic-oblong, acuminate at apex.

DINDINGS: at Lumut, *Curtis* 3445! (Herb. Singap. and Penang).

4. *NOTHAPHOEBE RETICULATA*, Gamble in Kew Bull. 224 (1910). A small tree reaching 12—15 m. in height and 15—25 cm. in diam.; branchlets moderately stout, pale brown; leaf-buds very small, rounded, pubescent. *Leaves* chartaceous; elliptic-obovate or oblanceolate, obtusely often cuspidately acuminate at apex, cuneate at base; both surfaces glabrous, prominently reticulate and pale olive-brown when dry; 12—22 cm. long, 4—8 cm. broad; midrib slender, slightly raised above, more so beneath; main nerves 8 to 12 pairs, starting at about 60° with the midrib and curving to and along the margin where they are connected, the lower by a series of small loops, the upper by larger ones, joined by a prominently reticulated network of nervules which are raised on both surfaces; petiole rather slender, 1.5—3 cm. long, the upper part bordered by the decurrent margins of the blade. *Flowers* in spreading glabrous axillary or subterminal many-flowered panicles reaching 15—20 cm. in length; rhachis somewhat flattened; branches distant, often decurved, often 6 cm. long; cymules subumbellate; pedicels slender, clavate; flowers secund. *Perianth*-tube short; lobes ovate, acute, the outer 3 rather the smaller, 1.5—2 mm. long. *Stamens* small, those of 1st and 2nd rows clavate, 1.5 mm. long, the anthers elongate, filaments slen-

der and villous ; those of 3rd row similar but slightly longer and with 2 rounded villous glands ; staminodes of 4th row very small, lanceolate, villous as the other stamens with purplish-red hairs. *Ovary* ovoid, attenuated into a slender style ; stigma large, peltate. *Fruit* an ovoid or ellipsoid berry 4 cm. long by 2—3 cm. in diameter, seated on the enlarged rugose pedicel about 1 cm. long, the perianth-tube forming a flattened ring, the lobes apparently deciduous ; pericarp rather thick, dark-brown when dry, with prominent raised corky ferruginous pustules.

PERAK : *Scortechini* ! ; at Gunong Bubu, 1500 m. alt., *Wray* 3872 ! ; at cottage, *Ridley* 2967 ! ; in dense jungle on high mountains at 1000—1200 m. alt., *King's Collector* 7002 !.

5. *NOTHAPHCEBE PANDURIFORMIS*, Gamble. A tree, reaching about 12 m. in height and a considerable girth ; branchlets stout, grey, rough, striate ; leaf-buds short, lanceolate, puberulous. *Leaves* thinly coriaceous, more or less fascicled towards the ends of the branchlets, alternate ; obovate or panduriform, obtuse or bluntly apiculate at apex, cordate-auriculate at base ; glabrous on both surfaces, nearly black when dry on the upper, reddish brown on the lower ; 20—30 cm. long, 7—10 cm. broad, in old trees smaller and with fewer nerves ; midrib broad, stout, usually flat on the upper surface, raised on the lower ; main nerves 12 to 20 pairs, more numerous near the base, at first nearly straight, then curved to close to the margin where they meet in loops, joined by prominent parallel transverse nervules and the reticulation ; petiole very stout, 5—6 mm. long, sometimes 0. *Flowers* very small, yellow, in branching axillary rusty-pubescent panicles 10—20 cm. long and scaly at the base ; branches slender ; terminal cymules subumbellate, densely rusty-tomentose ; bracts and bracteoles triangular, acute, very small ; pedicels thick, about 2 mm. long ; buds globose. *Perianth*-tube very short ; outer 3 lobes triangular, .5 mm. long ; inner 3 ovate, half as long again. *Stamens* minute ; those of 1st and 2nd rows clavate, .5 mm. long, apex glabrous, filaments coppery-villous ; those of 3rd row longer, obtuse at tip, basal glands none or extremely minute ; staminodes of 4th row triangular, glabrous in front, villous behind. *Ovary* ovate ; style short, curved ; stigma peltate. *Fruit* an obovoid or cylindric-oblong curved berry 5—7 cm. long and 2—2.5 cm. in diam., seated on the remains of the perianth and a slightly enlarged pedicel, the apex wrinkled and depressed ; pericarp coriaceous, rather thin, smooth, dull red, when dry dark brown ; seed cylindric,

cotyledons conform to fruit, the apex depressed. *Alseodaphne panduriformis*, Hook. f. in Fl. Br. Ind. V. 145.

PERAK : *Scortechini* 1130!; at Chaukat Sardang and Simpang, *Wray* 742!, 2039!; at Ulu Bubong up 180 m. alt., *King's Collector* 7815!, 10019!, 10433!, 10655!. SELANGOR: at Labu river, *Ridley* 7624!. MALACCA: *Maingay* K.D. 1263!; at Panchor, *Goodenough* 1258!; at Brisu, *Derry* 950!. PAHANG: at Ayer Etam, *Ridley* 2413!; at Chenei river, *Fox* 5010!.

Vern. 'Poko Rengas' (*Wray*); 'Medang Kladi' (*Goodenough*).

9. MACHILUS, Nees.

Evergreen trees; buds of the inflorescence with imbricate scales; leaf-buds lanceolate. *Leaves* alternate, penni-nerved, minutely reticulate. *Flowers* small or moderate-sized, hermaphrodite, in slender panicles, usually from the axils of upper leaves and appearing fascicled. *Perianth*-tube short or obsolete; lobes 6, subequal, or the outer slightly the smaller, persistent and reflexed or spreading in fruit. *Stamens* 9 perfect, with 4-celled anthers; those of the 1st row opposite the outer perianth-lobes, introrse, with long filaments and ovate or elliptic anther-cells; those of the 2nd row similar, introrse, opposite the inner perianth-lobes; those of the 3rd row opposite the 1st row stamens, extrorse, with oblong narrow anthers, slender filaments and a pair of stipitate glands at the base; staminodes of the 4th row cordate, stipitate, opposite the 2nd row stamens. *Ovary* sessile, narrowed into the style; stigma small or discoid. *Fruit* a globose or oblong berry, seated on the reflexed perianth which is hardly enlarged; fruiting pedicel not enlarged. —DISTRIB. About 25 species, all Asiatic, chiefly in north and north-east India and Burma, extending to China and Japan.

MACHILUS SCORTECHINII, Gamble in Kew Bull. 226 (1910). A tree, reaching 12 to 15 m. in height and 40 to 50 cm. in diameter of stem; branchlets dark brown, moderately stout, uppermost minutely tawny-puberulous as are the small lanceolate leaf-buds; scars of the inflorescence bud-scales prominent. *Leaves* chartaceous; obovate or obovate-oblong, shortly acute at apex, cuneate or attenuate at base; both surfaces dull, glabrous, olive-brown when dry; 10—20 cm. long, 4—7 cm. wide; midrib rather slender, channelled above, raised beneath; main nerves 8—10 pairs, slightly impressed above, raised beneath, at about 70° with the midrib,

curving to the margin, the upper ones joined in loops; transverse nervules irregular; reticulation prominently areolate under the lens; petiole slender, glabrous, 1—2 cm. long, channelled above. *Flowers* small, yellow, 6 mm. in diameter when open, in pedunculate grey-tawny pubescent axillary panicles reaching 10—20 cm. long; peduncles about one-third of the length of the panicle; branches spreading, dichotomous, subcorymbose, ending in 3-flowered dichasia; pedicels slender, 2—3 mm. long; buds globose. *Perianth-tube* very short; lobes subequal, ovate acute, densely tawny-tomentose without, sericeous within, 2—3 mm. long. *Stamens* slender; filaments silky-pubescent; those of 1st and 2nd rows 2 mm. long with ovate obtuse anthers; those of 3rd row as long, with oblong anthers and glabrous reniform stipitate glands; staminodes of 4th row cordate, villous-stipitate, 1 mm. long. *Ovary* oblong; style slender; stigma obtuse, small. *Fruit* not known.

PERAK: *Scortechini* 492!; an high mountains near Thaiping at 1000 to 1500 m. alt., *King's Collector* 8413!.

The fruit being unknown it is impossible to say for certain whether this species belong to *Phabe* or *Machilus*; but it has more the habit of *Machilus* than of *Phabe*.

10. PHÆBE, Nees.

Evergreen trees or shrubs. *Leaves* alternate, often fascicled at the ends of the branchlets, penni-nerved (in Asiatic species); leaf-buds lanceolate or ovate, with few and usually spreading scales, sometimes with none. *Flowers* hermaphrodite or rarely polygamous, in pedunculate panicles from the upper leaf-axils as if fascicled, the branches dichasioid. *Perianth-tube* short; lobes 6 subequal, the outer 3 somewhat shorter than the inner, spreading at flowering, afterwards closing, erect and enlarged. Perfect *stamens* 9, with 4-celled ovate-oblong anthers; those of the 1st row opposite the outer perianth lobes, with elliptic introrse anthers, and slender filaments; those of the 2nd row similar and also introrse, opposite the inner perianth-lobes; those of the 3rd row opposite those of the 1st row but extrorse, often rather longer and more slender, bearing at or a little above their bases two large stipitate glabrous glands; staminodes of the 4th row opposite the 2nd row stamens, cordate or sagittate, stipitate, glabrous within. *Ovary* sessile, usually globose; style slender; stigma obtuse. *Fruit* an ovoid, ellipsoid or globose berry, seated on a cup formed of the enlarged erect persistent

perianth-lobes; cotyledons fleshy, the embryo conform to the fruit.—
DISTRIB. Species about 20, in India and Malaya, with a further
14 American.

Leaves lanceolate, glabrous or nearly so.

Leaves long-acuminate, main nerves 10—15 pairs;

perianth glabrous; berry ovoid; filaments villous

1. *P. lanceolata*.

Leaves obtusely acuminate, main nerves 7—10

pairs; perianth glabrous or slightly puberulous,

berry globose; filaments glabrous ..

2. *P. declinata*.

Leaves obovate, hairy

Flowers rather large, 1 cm. broad when open.

Leaves chartaceous, cuneate at base; ferruginous-

pubescent beneath; perianth densely ferruginous-

tomentose

3. *P. macrophylla*.

Leaves coriaceous, rarely cuneate at base, glau-

cescent and minutely puberulous beneath only;

perianth greyish tomentose

4. *P. Kunstleri*.

Flowers small, under 6 mm. broad when open.

Leaves coriaceous, shortly cuneate or attenuate

at base; perianth densely tawny-pubescent;

panicles up to 25 cm. long

5. *P. opaca*.

Leaves thinly coriaceous, long cuneate at base;

perianth grey-tomentose; panicles up to 10

cm. long only

6. *P. cuneata*.

1. *PHOEBE LANCEOLATA*, Nees Syst. Laur. 109 (1836). A small evergreen tree; branchlets slender, with yellowish-white bark, young ones black when dry, villous, with persistent linear tawny-pubescent leafy scales; leaf-buds lanceolate with similar scales. *Leaves* chartaceo-coriaceous, usually clustered at the ends of the branchlets; lanceolate, long acuminate at apex, long cuneate at base; olive-brown and shining on the upper surface, pale brown on the lower, glabrous; 12—23 cm. long, 2—4 cm. broad; midrib slender, raised on both surfaces; main nerves 10 to 15 pairs, curving upwards to and along the margin, the upper ones joining in loops; transverse nervules and reticulation irregularly netted, prominent on the lower surface; petiole slender, 1—3 cm. long. *Flowers* in slender axillary glabrous subcorymbose panicles; peduncles slender, in flower about 5 cm. long, much longer in fruit; branches few, spreading, ending in dichasia; bracts linear, 5 mm. long, grey-puberulous; pedicels slender, clavate; buds obovoid, glabrous; flower pale yellow. *Perianth*-tube short; lobes ovate, subequal, 3 mm. long, villous within. *Stamens* of 1st and 2nd rows 1.5 mm. long, anthers oblong, obtuse, filaments and connective villous;

those of 3rd row rather large and with narrower anthers, furnished near the base behind with 2 reniform glabrous glands on short villous stalks or nearly sessile; staminodes of 4th row 1.25 mm. long, cordate, glabrous, villous-stipitate. *Ovary* globose; style slender; stigma peltate. *Fruit* an ovoid berry 12—13 mm. long, 7—8 mm. in diam., seated on the enlarged glabrous unequal erect perianth-lobes; pericarp smooth, black. Meissn. in DC. Prodr. XV. i. 34 (excl. var. γ .); Wight Ic. t. 1821; Brandis For. Fl. 377 and Ind. Trees, p. 532; Kurz For. Fl. II. 290; Hook. f. Fl. Br. Ind. V. 141; Prain Beng. Plants 900; Koord. & Val. Bijdr. X. 94; Ridley in Trans. Linn. Soc. 2nd Ser. III. 340 *Ocotea lanceolata*, Nees in Wall. Pl. As. Soc. II. 71. *Laurus lanceolata*, Wall. Cat. 2599. *L. lanceolaria*, Roxb. Fl. Ind. II. 309.

PAHANG : banks of Tahan river, Ridley 2272.—DISTRIB. India (subtropical Himalaya from the Sutlej eastwards), Burma, Java (Middle and East Java).

The description is taken entirely from Ridley's specimens which agree well in flower and fruit with the Indian ones, but have longer and narrower leaves with more numerous main nerves and more conspicuous reticulation.

2. *PHOEBE DECLINATA*, Nees Syst. Laur. 114 (1836). A tree; branchlets slender, grey, upper ones black when dry; leaf-buds small, lanceolate, slightly silky, without scales. *Leaves* chartaceo-coriaceous; lanceolate or elliptic-lanceolate, obtusely acuminate at apex, cuneate or attenuate at base; upper surface glabrous, shining, black-brown, lower reddish-brown or subglaucous, glabrous or very minutely puberulous; 7—12 cm. long, 2—4.5 cm. broad; midrib slender, impressed above; main nerves 7—10 pairs, very slender, obscure, curving upwards to and along the margin and joined by the minutely areolate reticulation; petiole slender, black, 1—2 cm. long, channelled above. *Flowers* in slender axillary black panicles, 8—12 cm. long; peduncles long, slender, terete; branches few, subcorymbose, ending in dichasia; pedicels slender, 2—5 mm. long, clavate; buds globose; flowers glabrous or slightly puberulous. *Perianth*-tube short; lobes ovate acute, subequal, the 3 outer slightly shorter, 2—3 mm. long, ciliate on the margins, silky within at the base. *Stamens* slender, 1 mm. long, glabrous except a tuft of silky hairs at the base; those of the 1st and 2nd rows with oblong anthers; those of the 3rd row with narrower anthers and two large stipitate glands at the base a little behind; staminodes of 4th row cordate-sagittate, silkily stipitate, 1 mm. long. *Ovary*

globose; style short; stigma capitate. *Fruit* a globose berry 7—10 mm. in diameter, seated on the short persistent scarcely enlarged perianth lobes and slightly enlarged pedicels; pericarp thin, black. Meissn. in DC. Prodr. XI. i. 34; Miq. Fl. Ind. Bat. I. i. 906; Hook. f. Fl. Br. Ind. V. 142; Koord. & Val. Bijdr. X. 95. *P. lanceolata*, var. γ . *ligustrina*, Meissn. l.c. *P. parviflora*, Bl. Mus. Bot. Lugd.-Bat. I. 327; Miq. l.c.; Meissn. l.c. *P. sumatrana*, Meissn. l.c. (non Miq. *fide* Koord. & Val.) *P. lamponga*, Miq. Fl. Ind. Bat. Suppl. 359. *Ocotea declinata*, Bl. Bijdr. 572. *O. ligustrina*, in part, Nees in Wall. Pl. As. Rar. II. 71 and III. 32. *Laurus declinata*, Bl. Cat. Hort. Buit. 66. *L. ligustrina*, Wall. Cat. 2588A. *Machilus* sp., Hook. f. Fl. Br. Ind. V. 862.

PENANG: at Penara Bukit, *Curtis* 942!, 1030!; at Balik Pulau, *Ridley* 9420!; Government Hill, *For* 47!. PERAK: in open jungle on hills at 250 to 400 m. alt., *King's Collector* 8748!. SELANGOR: at Ulu Selangor, *Goodenough* 10530!. SINGAPORE: *Wallich* 2588A; at Changi, *Ridley* 1811!, 4707!.—DISTRIB. Java (*Forbes* 594!), Sumatra.

Some of *Curtis'* specimens in Herb. Singap. have fruits with erect perianth-lobes and with reflexed perianth-lobes on the same shoot; apparently they are normally erect. The perianth-lobes are properly glabrous as described in the Fl. Br. Ind. but sometimes puberulous without as admitted by Koorders and Valetton. The following variety is only distinguishable by still greater silky pubescence.

var. *sericea*, Gamble. *Perianth*-lobes markedly silky villous without.

PERAK: on Haram Peak, *Scortechini* 554!

3. *PHOEBE MACROPHYLLA*, Blume in Mus. Bot. Lugd.-Bat. I. 326 (1851). An evergreen tree reaching 15 to 20 m. in height and 40 to 50 cm. in diameter of stem; branchlets stout, tuberculate, the upper parts with ferruginous tomentum, as are the thick conical leaf-buds with lanceolate scales. *Leaves* chartaceous; obovate or more rarely elliptic, shortly obtusely (occasionally acutely) apiculate at apex, cuneate or attenuate at base; upper surface shining, glabrous except on the midrib and main nerves, generally bullate, lower ferruginous-pubescent; margin recurved; 12—30 cm. long, 7—15 cm. broad; midrib very stout, impressed above as are the main nerves and transverse nervules, prominent beneath; main nerves 10 to 15 pairs, the lower ones very small and close together, curved outwards to and along the margin and joined, the lower by a series of small,

the upper by wide loops; transverse nervules many, prominent; reticulation irregularly areolate; petiole stout, very tomentose, 1.5—3 cm. long. *Flowers* rather large, greenish yellow, 1 cm. broad when open, closed after flowering, in long-peduncled densely ferruginous-tomentose panicles from the upper leaf-axils, reaching 25 cm. or longer and about 8 cm. in breadth; peduncles two-thirds of the length, tomentose even in fruit; branches spreading, corymbose, dichotomous, ending in 3-flowered dichasia; bracts and bracteoles lanceolate, caducous; pedicels short, clavate; buds globose. *Perianth*-tube short; lobes elliptic acute, the outer three slightly shorter than the inner which are 6—7 mm. long. *Stamens* large, the filaments and stalks of the glands and staminodes villous; those of 1st and 2nd rows 3 mm. long with elliptic emarginate anthers, those of 3rd row similar, but longer and oblong and narrow and with large stipitate glabrous reniform glands 1.5 mm. long; staminodes of 4th row cordate, acuminate, glabrous, with stalk 3 mm. long. *Ovary* globose, glabrous; style slender; stigma small, peltate when young. *Fruit* an ovoid-oblong berry 20 mm. long, 10 mm. in diameter, truncate at apex, seated on the enlarged puberulous perianth-lobes, nearly 10 mm. long; pericarp brown, shining, rather thin. Miq. Fl. Ind. Bat. I. i. 908; Meissn. in DC. Prodr. XI. i. 38; Koord. & Val. Bijdr. X. 88. *P. elliptica*, Blume l.c. *Persea macrophylla*, Blume Bijdr. 568 *in part*. *Machilus? macrophylla*, Nees Syst. Laur. 674 *in part*.

PERAK: at Waterloo, *Curtis* 2727!; *Scortechini* 1779!; hill forests about Larut up to 450 m. alt., *King's Collector* 3918!, 5607!, 5663!. SINGAPORE: at Bukit Mandai, *Ridley* 4581!, garden jungle, *Ridley* 3579!, 3891!, 13317!.

4. *PHOEBE KUNSTLERI*, Gamble in Kew Bull. 226 (1910). A large tree reaching 25 to 30 m. in height and 60 to 90 cm. in diameter of stem; branchlets stout, rugose, with prominent scars and oblong corky lenticels, uppermost tawny-puberulous; leaf-buds short, ovoid, tawny-pubescent. *Leaves* coriaceous; obovate or elliptic-obovate, obtuse or obtusely short apiculate at apex, attenuately narrowed at base for the lower half; upper surface shining, glabrous, lower glaucescent, minutely puberulous; margins slightly recurved; 12—24 cm. long, 6—11 cm. broad; midrib rather stout, impressed on the upper, raised on the lower surface; main nerves 8 to 12 pairs, impressed above, prominently raised beneath, curved to the margin where they meet in loops, joined by rather prominent distant trans-

verse nervules and an irregularly netted reticulation; petiole 1.5 to 4 cm. long, somewhat flattened above, puberulous. *Flowers* pale yellow, 10 mm. in diameter, in stout long-peduncled grey-tawny puberulous panicles from the axils of upper leaves, reaching about 20 cm. in length; peduncles 10—12 cm. long; branches 5 cm. long or less, dichotomous, subcorymbose, ending in pairs of flowers or 3-flowered dichasia; bracts caducous, triangular; pedicels slender, 5—6 mm. long; buds oblong, 5—7 mm. long. *Perianth*-tube short; lobes ovate acute, the outer 4 mm. long, the inner 5 mm., tomentose on both sides. *Stamens* slender, those of 1st and 2nd rows with elliptic anthers and long villous slender filaments 3 mm. long; those of the 3rd row 3.5 mm. long, the anthers oblong, truncate at apex, the two glands large, reniform, glabrous, attached a little above the base; staminodes of 4th series cordate, glabrous, villous behind and as the rather slender stipes, 2 mm. long. *Ovary* globose, minutely hirsute; style slender; stigma obtuse, slightly spreading. *Fruit* an ovoid berry 15 mm. long, 10 mm. in diam., truncate at apex, seated on the slightly spreading persistent glabrous perianth-lobes; pericarp bluish-green when fresh, nearly black and wrinkled when dry.

PERAK: in forests on hills near Goping up to 240 m. alt., *Kunstler* (*King's Collector*) 4491!, 6180!, 8173!; *Scortechini* 497!; at Blanda Mabok, *Wray* 3964!. SUNGEI UJONG: Herb. Singap. 2325 (Vern. 'Poko Medang Kusirai')!. SINGAPORE: at Pulau Ubri, *Ridley* 5915!.—DISTRIB. Borneo (*Haviland*!).

5. *PHOEBE OPACA*, Blume in Mus. Bot. Lugd.-Bat. I. 327 (1851). A tree reaching 20—25 m. in height and 40—50 cm. in diameter of stem; branches stout with whitish bark; branchlets thick, lenticellate, uppermost minutely puberulous; leaf-buds conical, 6—7 mm. long, densely tawny-puberulous, with leafy scales. *Leaves* coriaceous; obovate or oblanceolate or elliptic-obovate, shortly and obtusely acuminate at apex, cuneate or attenuate at base usually for some length; upper surface glabrous, shining, lower dull glaucescent, minutely puberulous, finally glabrous; 10—27 cm. long, 5—8 cm. broad; midrib stout, impressed above, raised beneath; main nerves 8 to 15 pairs, prominent beneath and often dark, variable in obliqueness, but all curving to and along the margin, joined by rather obscure parallel transverse nervules and an inconspicuous reticulation; petiole black, terete, 15—25 mm. long. *Flowers* 4—6 mm. broad when open, in spreading rusty-pubescent panicles from the axils of the uppermost leaves, appearing fascicled, reaching

25 cm. or more in length and 10 to 12 in breadth; peduncles about 12 cm. long; branches 2—3 cm. long, dichotomous, usually ending in 3-flowered dichasia; bracts lanceolate, leafy, early caducous; bracteoles similar but smaller; pedicels clavate; buds globose. *Perianth*-tube short; lobes elliptic, acute, 3—4 mm. long, the outer slightly shorter than the inner, densely tawny-pubescent. *Stamens* of 1st and 2nd rows with elliptic obtuse anthers 1.5 to 2 mm. long, and villous filaments; those of 3rd row oblong rather longer and with two large glabrous reniform stipitate glands near the base, back of connective, filaments and stalks of the glands villous; staminodes of 4th row cordate, apiculate, glabrous, on long villous stalks, 1 mm. in all. *Ovary* globose, glabrous or very slightly puberulous; style slender; stigma small. *Fruit* an ovoid berry, 15 mm. long, 10 mm. in diameter, depressed at apex, seated on the closely appressed persistent perianth-lobes, 5 mm. long and glabrous as is the fruiting rhachis of the panicle; pericarp smooth, shining, reticulate when dry. Miq. Fl. Ind. Bat. I. i. 909; Meissn. in DC. Prodr. XI. i. 36; Hook. f. Fl. Br. Ind. V. 143; Koord. & Val. Bijdr. X. 91. *P. attenuata*, Miq. in Pl. Jungh. 125. *P. densiflora*, Bl. l.c.; Miq. l.c.; Meissn. l.c. *P. javanica*, Meissn. l.c. 37. *P. malaccensis*, Meissn. l.c. 37. *P. lucida*, Bl. l.c.; Miq. l.c.; Meissn. l.c. *fide* Hook. f. *Alseodaphne? grandis*, Nees in Wall. Pl. As. Rar. II. 72 and Syst. Laur. 183; Meissn. l.c. 28. *Laurus grandis*, Wall. Cat. 2594A. *Persea grandis*, Nees in Wall. Pl. As. Rar. III. 32.

PENANG: Wallich 2594 A!. PERAK: hill forests near Perak, up to 450 m. alt., *King's Collector* 5980!, 8339!. MALACCA: Griffith K.D. 4255!; Maingay K.D. 1245!, 1246!; at Merliman, Goodenough 1620!; Holmberg 708!; Derry 922!; at Sadanun reserve, Derry 513!. JOHORE: at Kwala Sembrong, Lake and Kelsall 4013!?. SINGAPORE: at Pulau Ubu, Ridley 5915!—DISTRIB. Java, Sumatra, Borneo.

Var. *cuspidata*, Gamble. *Leaves* cuspidate-acuminate at apex, rather thin; *perianth*-lobes shorter, less pubescent.

PERAK: near Ulu Kerling at 150—250 m. alt., *King's Collector* 8538!.

6. *PHOEBE CUNEATA*, Blume in Mus. Bot. Lugd.-Bat. I. 908 (1851). A tree reaching 20 to 25 m. in height and 60—90 cm. in diameter of stem; branchlets stout, pale-brown, with prominent scars and lenticels, uppermost tawny-pubescent. *Leaves* thinly coriaceous, more or less fasciated at the ends of the branchlets;

obovate or obovate-oblong, shortly acute or acuminate at apex, long-cuneate at base; upper surface shining, glabrous except at the midrib, lower tawny-puberulous especially at the nerves; margins slightly recurved; 10—25 cm. long, 4—8 cm. broad; midrib prominent, impressed above, raised beneath; main nerves 8—12 pairs, slightly impressed above, curving obliquely upwards to the margin, the upper ones joining in loops; transverse nervules prominent, subparallel; reticulation prominent under the lens; petiole 10—25 mm. long, densely tawny-tomentose. *Flowers* about 3—6 mm. broad when open, in long-peduncled greyish-tawny panicles from the uppermost leaf-axils, reaching 10 cm. in length in flower, much longer in fruit; branches few, spreading, ending in subcorymbose dichasia; pedicels 2—4 mm. long, clavate; buds globose; flowers yellowish. *Perianth*-tube short; lobes subequal, the outer 3 rather the shorter, ovate acute, about 3 mm. long, densely grey-tomentose. *Stamens* of 1st and 2nd rows 1.5—2 mm. long, the anthers elliptic obtuse or emarginate, glabrous in fruit, the filaments villous; those of 3rd row rather longer and similar but the anthers narrower, oblong, the 2 basal glands large glabrous reniform villous-stipitate; staminodes of 3rd row cordate, 1.25 mm. long, villous-stipitate, *Ovary* rounded, glabrous; style slender; stigma small. *Fruit* an ovoid or ellipsoid berry reaching 20 mm. long and 12 mm. in diameter, truncate at apex, seated on the enlarged, puberulous, appressed or somewhat spreading perianth-lobes; pericarp bluish-green when fresh, pale and shining when dry, finally black. *Miq.* Fl. Ind. Bat. I. i. 908; *Meissn.* in DC. Prodr. XI. i. 36; *Koord. & Val.* Bijdr. X. 90. *P. multiflora*, Bl. l.c.; *Miq.* l.c.; *Meissn.* l.c. (*fide* *Koord. & Val.*). *Persea macrophylla* var. *cuneata*, Bl. Bijdr. 568. *Machilus macrophyllus* var. *Nees* Syst. Laur. 674.

PROVINCE WELLESLEY: at Kubong Ulu Reserve, *Curtis* 2425 l. PERAK: Maxwell's Hill, *Ridley*!; in dense jungle near Larut up to 1300 m. alt., *King's Collector* 801!, 2646!, 6249!, 6577!, 6616!, 6995!, 10893!; at lower camp, Gunong Batu Pateh, over 1000 m. alt., *Wray* 1186!. SINGAPORE: at Changi, *Ridley* 4812!—DISTRIB. Java.

11. STEMMATODAPHNE, Gamble.

Trees. *Leaves* alternate, membranous, crowded towards the ends of the branchlets; the nerves conspicuous. *Flowers* in umbels in lax panicles from the upper leaf-axils; pedicels very long and

conspicuous. *Perianth*-lobes 6, subequal, with a raised ring at their base inside. *Stamens* 9 fertile with 4-celled anthers; those of the first and second rows short triangular with no or very short broad filaments, introrse; those of the 3rd row similar but with extrorse or marginal anther-cells, and with two minute glands at the base, sometimes absent; staminodes of the 4th row triangular, sessile; the staminal ring detachable. *Ovary* usually globose; style short; stigma minute. *Fruit* a large globose berry; fruiting perianth persistent, the lobes erect or somewhat reflexed; the pedicel enlarged, clavate.—**DISTRIB.** One species.

STEMMATODAPHNE PERAKENSIS, Gamble in Kew Bull. 227 (1910). A tree with spreading branches reaching 10 to 12 m. in height and 30 to 45 cm. in diam. of stem; branchlets moderately stout, with greyish white bark; leaf-buds lanceolate, tawny-pubescent. *Leaves* membranous; obovate, long acuminate at apex, cuneate, attenuate or sometimes a little rounded at base; both surfaces glabrous, the upper nearly black when dry, often bullate, the lower dark brown; 12–30 cm. long, 6–12 cm. broad; midrib stout, flat or slightly impressed above, much raised beneath; main nerves 10 to 15 pairs, unequally distant, slightly impressed above, raised beneath, straight or slightly curved to near the margin, where the lower ones end in a series of small loops and the upper ones are joined by prominent large loops forming a continuous intramarginal nerve to the apex; transverse nervules parallel, slender, more or less impressed above, smaller reticulation not prominent; petiole variable in length, 1–5 cm. long, channelled above, glabrous. *Flowers* small, in lax slightly puberulous panicles from the upper leaf-axils, reaching 10–12 cm. in length and black when dry; peduncles slender, 3–7 cm. long; branches few, 1–1.5 cm. long, ending in 4–5-flowered umbels; pedicels conspicuous, red, clavate, minutely puberulous, 10–15 mm. long; buds globose. *Perianth*-lobes subequal, rounded, 1–2 mm. long, with a pubescent ring at their base within behind the stamens. *Stamens* triangular, with no or very short thick villous filaments, all .5–.7 mm. long, those of 3rd row with very minute or no basal glands; staminodes of 4th row triangular acute, .6 mm. long, villous at base. *Ovary* ovoid-globose; style very short, conical; stigma minute. *Fruit* a large obovoid globose berry reaching 6 cm. in length and 4–5 cm. in diameter, seated on the persistent more or less reflexed perianth-lobes and the enlarged clavate warted pedicel 2–3 cm. long and 5–7 mm. broad at top; pericarp smooth.

PERAK: at Thaipeng, Wray 2658!; at Kwala Dipong, *Scortechini* 1793!; Ulu Bubong and Larut Hills up to 300 m. alt., *King's Collector* 3153!, 6703!, 10541!. MALACCA: at Batang Malacca, *Derry* 203!, 1157!. Vern. 'Medang Taying' (*Derry*), 'Meddang Katanah' (*Herb. Singap.* 920!), 'Medang Kuning' (*Herb. Singap.* 865!).

Tribe VI. LITSEÆ.

12. ACTINODAPHNE, Nees.

Evergreen trees or shrubs. *Leaves* subverticillate, rarely scattered or opposite, penni-nerved, sometimes 3-ribbed at base, leaf-buds with imbricate perulate scales. *Flowers* small, diœcious, in axillary or lateral dense bracteate sessile or peduncled clusters or short racemes bearing bracteate umbellules of usually 5; the bracts imbricate, caducous; the pedicels lengthening after the fall of the bracts. *Perianth*-tube short; lobes 6, sub-equal. *Stamens* in ♂ flowers 9; those of the 1st row 3, opposite the outer perianth-lobes; those of the 2nd row 3, opposite the inner, both without glands; those of the 3rd row opposite those of the 1st the filaments 2-glandular; anthers all oblong, introrse, 4-celled; filaments slender. *Staminodes* in ♀ flowers also 9, those of the 1st and 2nd rows spatulate or linear, eglandular, those of the 3rd row linear and biglandular. *Ovary* in ♀ flowers ovoid, attenuate into the style; stigma dilated; in ♂ flowers rudimentary and empty or obsolete. *Fruit* a berry resting on the enlarged hardened flat or concave perianth-tube, the perianth-lobes usually persistent. *Seed* with thin testa; cotyledons very thick, usually hemispheric.—DISTRIB. About 50 species, in India, the Malay Peninsula and Archipelago and eastwards to Japan.

I regret to say that I am not very well satisfied with the work done on this most difficult genus, and especially with the following analysis. Except in the first three species the material available has been meagre and characters difficult to obtain.

Leaves at least 10—20 cm. long by 4—12 cm. broad;
drupe globose.

Leaves oblanceolate, coriaceous, fruiting perianth discoid.

Leaves in whorls of up to 12 or more, lower surface glabrous or nearly so; drupe 20—25 mm. in diam.

1. *A. sesquipedalis*.

Leaves in whorls of 6 to 10, lower surface rusty-tomentose; drupe 10—13 mm. in diam.

2. *A. Maingayi*.

- Leaves obovate, chartaceous, lower surface puberulous, glaucous; drupe 10—12 mm. in diam.; fruiting perianth disciform 3. *A. glomerata*.
- Leaves lanceolate, chartaceous, lower surface glabrous, glaucous; fruiting perianth cup-shaped .. 4. *A. montana*.
- Leaves not reaching 10—20 cm. long by 4—12 cm. broad; drupe globose or ovoid; fruiting perianth usually cup-shaped.
- Leaves usually over 10 cm. in length, more or less lanceolate.
- Leaves coriaceous, glabrous, glaucous beneath; fruiting perianth flattened 5. *A. johorensis*.
- Leaves subcoriaceous, usually puberulous beneath, not glaucous; fruiting perianth cup-shaped 6. *A. malaccensis*.
- Leaves chartaceo-coriaceous, tawny-villous beneath; fruiting perianth cup-shaped, rugose 7. *A. Ridleyi*.
- Leaves usually under 10 cm. in length, at most under 12 cm. coriaceous.
- Leaves lanceolate or oblanceolate, acuminate at apex.
- Leaves glaucous or glaucescent beneath, puberulous only when young 8. *A. pruinosa*.
- Leaves greyish-tawny-pubescent at all times 9. *A. Hullettii*.
- Leaves elliptic oblong, obtuse at apex, glaucous beneath 10. *A. oleifolia*.
- Leaves elliptic-ovate or obovate, white-glaucous beneath.
- Leaves cuspidate-acuminate at apex .. 11. *A. cuspidata*.
- Leaves bluntly acute at apex.. .. 12. *A. fragilis*.

1. ACTINODAPHNE SESQUIPEDALIS, Hook. f. and Th. in Herb. Ind. Or.; Hook. f. in Fl. Br. Ind. V. 151 (1886). A large tree reaching 15 to 20 or more metres in height and 50 to 75 cm. in diameter of stem; branchlets very stout, light-tawny-pubescent, the uppermost silkily villous; verticil-nodes marked by the very prominent scars of fallen leaves and leaf-bud scales; terminal branch-buds very large with imbricate tawny-pubescent scales, the outer ones leaf-like reaching 5 cm. or more in length and 4 cm. in diam. *Leaves* coriaceous, in prominent whorls of 12 or more; oblanceolate, shortly acuminate at apex, cuneate at base; upper surface shining, smooth, lower subglaucous, silky-villous especially on the nerves, at length glabrous; 20—50 cm. long, 4—12 cm. broad; midrib stout, channelled above, strongly raised beneath and often very silky-villous; main nerves 15 to 20 pairs, at about 30° with the midrib, only slightly curved near the margin, raised on both surfaces; transverse nervules and reticulation inconspicuous; petiole very stout, tawny-villous, 1—2 cm. long. *Flowers* in dense clusters 1 to 3 cm. in diameter on

the branchlets between the upper verticils and supported by orbicular concave deciduous bracts; clusters bearing a number of shortly peduncled involucre each of 4 orbicular concave deciduous bracts and enclosing an umbellule of 5 flowers, the centre one longer peduncled (5 mm.) than the 4 outer (2 mm.); ♂ and ♀ flowers similar with short perianth-tubes and 6 subequal concave perianth-lobes, pubescent without, glabrous within, 5-nerved and prominently gland-dotted at length recurved. *Stamens* of ♂ flowers in 3 rows, those of the 2 outer rows eglandular, those of the inner row with a pair of long sessile glabrous glands; anthers oblong 1.5—2 mm. long, glabrous; filaments as long as anthers with a thick tuft of golden-tawny unicellular hairs. *Staminodes* of ♀ flowers oblong or lanceolate, glabrous, the inner row biglandular. *Ovary* short, villous, that of ♂ flowers rudimentary or 0, that of ♀ flowers ovoid; style thick, curved; stigma peltate, large, crenately 3—4-lobed. *Fruit* globose, orange when ripe, smooth, shining, 20—25 mm. in diam. seated on the enlarged thickened rugose perianth which is cup-shaped when young, at length disciform, 10—15 mm. in diam.; pericarp thick, fleshy, shining. *Litsæa macrophylla*, Kurz For. Fl. II. 305 not of Blume. *Myristica sesquipedalis*, Wall. Cat. 6809.

PENANG: *Wallich* 6809!; at Waterfall and Pulau Boetong, *Curtis* 2304!, 2473!. PERAK: at Maxwell's Hill, 4000 ft., *Curtis* 2053!; *Scortechini* 209!; at Relan Tujor, *Wray* 4225!; Goping, Larut, etc., up to 1000 ft., *King's Collector* 4399!, 5008!, 5147!, 6435!, 7202!.—DISTRIB. Tenasserim, at Mergui, *Griffith* 4327!

2. ACTINODAPHNE MAINGAYI, Hook. f. in Fl. Br. Ind. V. 151 (1886). A large tree reaching 15 to 20 m. or more in height and a considerable diameter of stem; branchlets very stout, dark tawny-pubescent, the uppermost and innovations densely villous with brown hairs, verticil-nodes marked by the prominent scars of fallen leaves and leaf-bud scales; terminal branch-buds oblong with imbricate scales, the outer ones leaf-like reaching 1 to 2 cm. in length and densely tawny-pubescent. *Leaves* coriaceous, in whorls of about 6 to 10; oblanceolate or elliptic-oblong or oblong-obovate, shortly acuminate at apex, cuneate or attenuate at base; upper surface shining, glabrous except the nerves, lower rusty-tomentose especially on the nerves, younger ones subglaucous between them; 15 to 40 cm. long, 5—12 cm. broad; midrib stout, slightly raised, flattened and tomentose above, much raised beneath; main nerves 10 to 20 pairs at about 40° to 50° with the midrib, curved upwards to the

margin, impressed above and pubescent, strongly raised, beneath; transverse nervules very prominent, subparallel, much raised beneath, slightly depressed above, joined by a prominent reticulation; petiole very stout, rusty-tomentose, 2 to 4 cm. long. *Flowers* in dense clusters about 2 cm. in diam. on the internodes between the upper verticils and supported by orbicular concave bracts glabrous within; clusters bearing many stoutly-peduncled involucre each of 4 orbicular concave bracts enclosing an umbellule of 5 flowers, the centre one longer peduncled than the 4 outer; ♂ and ♀ flowers similar with 6 subequal ovate concave perianth-lobes, tomentose without, glabrous within, 5—7 nerved, prominently gland-dotted, at length recurved, 4—5 mm. long. *Stamens* of ♂ flowers in 3 rows, the inner row with a pair of large rugose glabrous glands a little above the base of the filaments; anthers elliptic-oblong, 2 mm. long, glabrous; filaments rather longer with a tuft of tawny-brown hairs at their bases. *Stamens* of ♀ flowers reduced to lanceolate glabrous staminodes. *Ovary*, style and stigma of ♀ flowers not seen, in ♂ flowers 0. *Fruit* globose, bright yellow when ripe, smooth, 10—13 mm. in diam., seated on the flat, enlarged, 6-lobed perianth 10 mm. in diameter and villous beneath, the lobes reflexed; pericarp thick, fleshy; pedicels little enlarged, 3 mm. long, villous.

PERAK: at lower camp, Gunong Batu Pateh, at 1000 m. alt. *Wray* 915!, at Tapah *Wray* 1333!; at Goping on low ground up to 150 m., *King's Collector* 6172!. MALACCA: *Maingay* K.D. 1258!, 1275!. SINGAPORE: at Pulau Ubin, *Ridley* 9489!, at Bukit Timah *Ridley*!

Kunstler says: "this is a very fine-looking tree" and indeed it must be.

Var. *macrocarpa*, Gamble. *Leaves* only slightly pubescent beneath and more glaucous; *fruit* depressed-globose 2—2.5 cm. in diameter.

PERAK: at lower camp, Gunong Batu Pateh, 1000 m. alt. *Wray* 1230! (a bush); in dense jungle on high mountains, Larut, 900—1200 m., *King's Collector* 6435! (a small tree 20 to 25 ft. high). PAHANG: at Telan, *Ridley* 13783!—DISTRIB. Borneo, at Matang, *Ridley* 11675!?

Var. *elliptica*, Gamble. *Leaves* elliptic, acuminate at apex, rounded attenuate at base, glaucous and pubescent beneath, 20—25 cm. long, 10—12 cm. broad; young fruit in pedunculate cymes about 3 cm. long.

PERAK: at lower camp, Gunong Batu Pateh, *Wray* 1226!.

3. ACTINODAPHNE GLOMERATA, Nees Syst. Laur. 597 (1836). A spreading tree reaching 10 to 12 m. in height and 30 to 45 cm. in diam. of stem; branchlets fairly stout, striate, shortly rusty-puberulous, ultimately glabrescent; verticil-nodes scarred; innovations densely silky pubescent; terminal branch-buds with the outer scales leaf-like 2—3 cm. long and the inner ones persistent at intervals on the internodes very silky and about 15 mm. long. *Leaves* chartaceous, in whorls of 4 to 7; obovate, abruptly acuminate at apex, acute or cuneate at base; upper surface glabrous except on the nerves, scarcely shining, lower pale grey to glaucous, minutely velvety puberulous, rusty-pubescent on the nerves; 10—30 cm. long, 6—12 cm. broad; midrib moderately stout, rusty pubescent, slightly raised on the upper, more so on the lower surface; main nerves 8 to 12 pairs at about 50° with the midrib, at first straight, then curved to and along the margin, raised on both surfaces; transverse nervules many, subparallel, prominent beneath, other reticulations scarcely visible; petiole pubescent, 2—2.5 cm. long. *Flowers* yellowish, in clusters of rather long-pedunculate rusty-pubescent cymes on the branchlets between the upper verticils or axillary at those verticils supported by orbicular concave deciduous bracts; cyme-peduncles slender, up to 2 cm. long, bearing umbellules of 5 flowers or less, supported by an involucre of 4 boat-shaped ovate bracts up to 1 cm. long; pedicels slender, those of the central flower longest at first, afterwards all subequal, 5 mm. long; perianth-tube very small or none; lobes ovate, glabrous within, 3—4 mm. long, 3—5-nerved. *Stamens* of ♂ flowers in 3 rows, those of the 1st and 2nd rows eglandular, 4 mm. long, with oblong obtuse anthers and slender filaments bearing a tuft of tawny hairs at the base; those of the 3rd row as long but with more rounded anthers, and the filaments bearing tufts of tawny hairs and halfway from the base two large glabrous ovoid glands; pistil of ♀ flowers none. *Staminodes* of ♀ flowers, ovary, style and stigma not seen. *Fruit* depressed-globose, up to 12 mm. in breadth and 10 mm. high, shortly apiculate, in compound umbels with thickened peduncles, seated on the flattened disciform enlarged perianth not lobed at the margins and about 6 mm. in diam.; pericarp thick, smooth, apparently yellow; cotyledons hemispheric. Blume in Mus. Bot. Lugd.-Bat. I. 343; Miq. Fl. Ind. Bat. I. i. 968; Meissn. in DC. Prodr. XV. i. 215; Koord. & Val. Bijdr. X. 114. *Litscea glomerata*, Bl. Bijdr. 566; Nees in Wall. Pl. As. Rar. II. 65. *Laurus glomerata*, Bl. Cat. Hort. Buit. 66.

PERAK: in open jungle on marshy ground under 100 m. alt., *King's Collector* 4192!. SINGAPORE: at Bukit Tima, Bukit Mandai and Bukit Panyang, *Ridley* 6296!, 6741!, 12529!.—DISTRIB. Java (*Forbes* 526 !), Sumatra.

4. *ACTINODAPHNE MONTANA*, Gamble in Kew Bull. 312 (1910). A tree reaching 15 to 20 m. in height and 30—45 cm. in diam. of stem; branchlets dark brown, glabrous, striate; shoot-buds cylindro-conical, 1 cm. or more long, perulate, the scales ovate, rusty-villous, with recurved tips. *Leaves* chartaceous, in whorls of 4—5, the nodes thickened; lanceolate or oblanceolate, long acuminate at apex, acuminate at base; both surfaces glabrous, the upper brown when dry, paler near the nerves, the lower bluish-green beneath, grey-glaucous when dry; 15—25 cm. long, 4—8 cm. broad; midrib prominent, raised on both surfaces; main nerves 8—10 pairs, very oblique, at about 30° with the midrib, gently curving to join in serial loops near the margin; transverse nervules prominent, usually arched, enclosing the netted reticulation; petiole rather slender, 1—3 cm. long, channelled. *Flowers* in umbellules in pubescent racemes about 2 cm. long from the internodes between the whorls, the flowers themselves not known. Young *fruit* (mature not known) enclosed in the cup-shaped enlarged perianth-tube, puberulous without, villous within, the cup as long as the rather slender enlarged pedicels.

PERAK: in open forest on mountain tops near Larut at 900—1100 m. alt., *King's Collector* 2129!, 2913!.

This species comes very near to *A. angustifolia*, Nees, but differs in having the nerves of the leaves not raised and in a much longer cup to the fruiting perianth-tube. When the flowers and ripe fruit are obtained it may be possible to say if it is not a variety only.

5. *ACTINODAPHNE JOHORENSIS*, Gamble in Kew Bull. 313 (1910). A tree?, branchlets terete, greyish-brown, glabrous, uppermost slightly rufous-villous; buds small, villous. *Leaves* coriaceous, in whorls of 3—5; narrowly lanceolate, obtuse at apex, long-cuneate at base; glabrous on both surfaces, the upper shining, olive-green when dry, the lower glaucous-grey; 12—16 cm. long, 3—5 cm. broad; midrib slender, raised on both surfaces; main nerves distant, 6—7 pairs, oblique, raised on the upper surface, joining in loops near the margin; secondary nerves few; transverse nervules very faint on the upper surface; reticulation minutely areolate, almost invisible; petiole 2—3 cm. long, channelled. *Flowers* in apparently sessile

umbellules on the internodes between the leaf-whorls, otherwise not known. *Fruit* a globose drupe 12 mm. in diam., seated on the flattened lobed enlarged perianth-tube 7 mm. in diam.; fruiting pedicel thick, 8 mm. long; pericarp dull black when dry.

JOHORE: at Gunong Panti, 300 m. alt., *Ridley* 4419!—DISTRIB. Lingya.

6. *ACTINODAPHNE MALACCENSIS*, Hook. f. in Fl. Br. Ind. V. 148 (1886). A tree; branchlets rather stout, densely rusty-tomentose; terminal branch-buds lanceolate, the outer scales leaf-like, up to 1 cm. long. *Leaves* subcoriaceous, in whorls of 4 to 7; elliptic-oblong or lanceolate, obtusely acuminate at apex, attenuate at base; upper surface shining, glabrous, lower puberulous when young, glabrous when old except sometimes on the nerves; 10—20 cm. long, 4—7 cm. broad; midrib rather slender, raised on the upper surface; main nerves 8—12 pairs, often rather irregular and branched, impressed above, conspicuous beneath; transverse nervules few, irregular; reticulation obscure; petiole rusty-tomentose, 1—2 cm. long. *Flowers* in globose clusters 7—13 mm. in diam. at the verticils or on the internodes between them, supported by small orbicular deciduous bracts; clusters with many sessile involucre each of 4 orbicular concave bracts 2—3 mm. long, pubescent without glabrous within and 1—3-nerved; each involucre bearing an umbellule of 3 flowers, the middle one longer pedicellate than the side ones; ♂ and ♀ flowers similar, with 6 ovate ciliate perianth-lobes 2 mm. long, puberulous without, glabrous within. *Stamens* of ♂ flowers in 3 rows, 1.5 mm. long, the anthers ovate, the filaments hidden in tufts of tawny-silky hairs, those of the inner row with 2 large nearly basal reniform glabrous glands; rudimentary ovary conical. *Staminodes* of ♀ flowers also in 3 rows, those of the 2 outer rows clavate, those of the third row hastate with two large glabrous glands on the filaments; filaments always with tufts of silky hair. Ovary sub-globose; style short, slender; stigma broadly peltate. *Fruit* 'globose, 8 mm. in diameter, seated on the very small cup-shaped thickened perianth-tube 3 mm. in diam.; pedicel very short and thick' (Hooker).

MALACCA: *Maingay* K.D. 1259!; *Hullett* 647!. SINGAPORE: in garden jungle, *Ridley* 9123!

7. *ACTINODAPHNE RIDLEYI*, Gamble in Kew Bull. 312 (1910). A tree?; branchlets terete, cylindric, uppermost rusty-pubescent; buds

small. *Leaves* chartaceo-coriaceous, in whorls of 4 to 6; lanceolate, acuminate and mucronate at apex, acuminate at base; upper surface shining, glabrous, areolate, lower tawny-villous, pubescent on the midrib and nerves; margins somewhat recurved; 10—16 cm. long, 3—5 cm. broad; midrib slender, raised on both surfaces; main nerves 6—8 pairs, curving upwards to join in small loops near the margin; transverse nervules straight, obscure as is the reticulation, which under the lens seems punctate on the upper surface; petiole moderately stout, rusty-pubescent, 1—2 cm. long. *Flowers* in sessile axillary or lateral umbellules supported by chaffy deciduous scales; involueral bracts orbicular, deciduous; flowers about 4 in each umbellule; perianth-tube 2.5 mm. long; perianth-lobes obovate, obtuse, 3.5 mm. long, densely villous without, glabrous within. *Stamens* of ♂ flowers unknown. *Staminodes* of ♀ flowers 9, those of the outer two rows linear-clavate 1.5 mm. long, the filaments villous, those of the 3rd row similar but with a pair of large subreniform glabrous glands a little above the base. *Ovary* obovoid, hirsute on top; style slender, curved; stigma small, 3-lobed. *Fruit* a globose drupe nearly 1 cm. in diam., seated on the enlarged rugose cup-shaped perianth-tube which is surmounted by the persistent lobes and staminodes; pericarp shining, glabrous.

JOHORE: at Gunong Pulau, *Ridley* 12165!—DISTRIB. Borneo (*Haviland*).

8. *ACTINODAPHNE PRUINOSA*, Nees in Wall. Pl. As. Rar. II. 68 (1831), III. 31 (1832) and Syst. Laur. 591. A tree; branchlets slender, pale brown, uppermost rusty-tomentose; terminal buds lanceolate 1—1.5 cm. long, with many acuminate glabrous chaffy imbricate scales. *Leaves* coriaceous, in whorls of 4 to 6; lanceolate elliptic-lanceolate or oblanceolate, acuminate often caudately at apex, cuneate at base; upper surface shining, smooth, lower glaucous or glaucescent, finely puberulous when young; 7—12 cm. long, 3—5 cm. broad; midrib red, slender, raised on both surfaces; main nerves 8 to 10 pairs, slender, rather irregular, curved to and along the margin, slightly impressed on the upper surface, raised beneath; reticulation obscure; petiole slender, 7—13 mm. long. *Flowers* sessile or peduncled in fascicles on the internodes between the verticils or at the verticils themselves, supported by orbicular basal bracts; ♂ in globose heads up to 1 cm. in diam., when in bud in shortly-peduncled umbellules supported by 4 concave early caducous hispid bracts, the outer ones keeled and 4 mm. long; umbel-

lules of 3 (or 5, two being rudimentary) flowers, the central one pedicelled, the side ones sessile at first but afterwards pedicelled, each flower with 6 orbicular ciliate perianth-lobes glabrous within afterwards reflexed; ♀ in tawny-pubescent cymes 1 cm. long, the cymes branching and bearing similar bracteate umbellules of 3—5 flowers, flowers with a shortly campanulate perianth-tube, tawny-villous within, and 6 ovate reflexed perianth lobes 1.5 to 2 mm. long. *Stamens* of ♂ flowers in 3 rows, those of 2 outer rows oblong-ovate with slender villous filaments, those of 3rd row similar but with two large glabrous glands on the filaments; staminodes of ♀ flowers small, those of two outer rows slender oblong with villous filaments, those of 3rd row hastate with a pair of large glands at the base. *Ovary* ovoid; style curved, slender; stigma peltate; ovary of ♂ flowers similar but very small. *Fruit* a globose drupe, 5—7 mm. in diam., seated on the cupular, turbinate, enlarged perianth-tube about 6 mm. in diam., lobes deciduous leaving a waving margin; pericarp smooth; enlarged pedicel clavate, up to 7 mm. long, Meissn. in DC. Prodr. XV. 1. 216; Hook. f. in Fl. Br. Ind. V. 152; Miq. Fl. Ind. Bat. I. i. 967. *Laurus pruinosa*, Wall. Cat. 2584 A. B.

PENANG: Wallich 2584 B!; at Moniot's road, 1200 ft. (both ♂ and ♀) Curtis 10201. SINGAPORE: Maingay, K.D. 1253!; at Changi, Ridley 2768! (leaves rather larger and less glaucous than type and fruiting pedicels longer).

Var. *Kunstleri*, Gamble. Upper branchlets less pubescent. Leaves less acuminate at apex, more so at base. *Drupè* globose, up to 1 cm. in diam., seated on a smaller more thickened turbinate cupule 6 mm. in diam. at mouth; pedicels shorter, less clavate.

PERAK: dense jungle on low ground near Larut at 90—150 m. alt., King's Collector 6063!.

9. *ACTINODAPHNE HULLETTII*, Gamble in Kew Bull. 314 (1910). A tree; branchlets rather slender, dark greyish-brown, uppermost closely tawny-pubescent. Leaves coriaceous, in whorls of 3 to 5; oblanceolate, acuminate at apex, cuneate at base; upper surface shining, glabrous except on the midrib, lower softly and closely greyish-tawny-pubescent; 7—11 cm. long, 2—3 cm. broad; midrib slender, raised on both surfaces, tawny-pubescent, branching into 5—6 pairs of very oblique (20°—30°) main nerves which often again branch; transverse nervules few, only apparent in very old leaves; reticulation not visible; petiole 5—10 mm. long, tawny-pubescent. *Flowers*

in bracteate axillary or lateral clusters, the bracts deciduous leaving a thick very short peduncle; ♂ flowers on pedicels 2—3 mm. long; perianth-tube short, villous; perianth-lobes ovate, ciliate, pubescent without, glabrous within, 2.5 mm. long. *Stamens* 9, those of the 1st and 2nd rows shortly oblong on short villous filaments, those of the 3rd row rather shorter and with each a pair of large reniform glands; rudimentary ovary ovoid, with short style; staminodes of ♀ flowers not known, nor fruit.

SINGAPORE: in Botanic Garden (wild?) *Hullett* 659!—also sheet in Herb. Kew with number 38=2 'from botanic garden'!

10. *ACTINODAPHNE OLEIFOLIA*, Gamble in Kew Bull. 313 (1910), A shrub or small tree, scarcely 2—3 m. high; branchlets slender. terete, pale greyish-brown, uppermost densely and softly ferruginous-villous as are the leaf-buds and inflorescence. *Leaves* coriaceous, in whorls of 4—8; elliptic-oblong or -lanceolate, very obtusely attenuate at apex, shortly attenuate at base; upper surface shining or rather dull, prominently areolately pitted, lower surface paler or glaucous, both surfaces glabrous; 5—11 cm. long, 2—3 cm. broad; midrib stout, prominent, reddish; main nerves 8—10 or more, prominent and raised above, at about 70° with the midrib, curved upwards to anastomose near the margin; secondary nerves many; transverse nervules arched, reticulation areolately netted; petiole red, slender, 1—2 cm. long, slightly twisted. *Flowers* in dense tawny-villous cymose clusters of umbellules in the axils of the verticils or on the internodes between them, supported by orbicular concave deciduous bracts; umbellules usually of 5 flowers, the centre one the longest, surrounded by 5—6 concave imbricate involucre bracts; in ♂ flowers umbels 1 to about 3, in ♀ flowers apparently only 1; perianth-lobes ovate, densely villous without, glabrous within, 2—3-nerved, the inner 3 slightly the smaller and narrower, 2—3 mm. long. *Stamens* of ♂ flowers in 3 rows, the inner row with 2 large reniform sessile glands, filaments villous with golden-tawny hairs; staminodes of ♀ flowers also in 3 rows, the outer 2 rows spatulate, the inner hastate with 2 large glabrous glands. *Ovary* in ♂ flower without ovules; style slender; stigma capitate, lobed. *Fruit* ovoid-oblong, 7—12 mm. long, 4—7 mm. broad, the base supported by the cup-shaped enlarged perianth-tube which is surmounted by the persistent perianth-lobes and 5—7 mm. broad at top; pedicels thickened, 5 mm. long, tawny-villous; pericarp smooth, surmounted by the persistent style.

PERAK: at Gunong Batu Pateh, 1400 m. alt., *Wray* 280!, at Gunong Inas, 1500 m., *Wray* 4111!; in open jungle on top of Gunong Batu 1500—1600 m., *King's Collector* 7347!; at 1500 m., *Scortechini* 350!. PAHANG: at Gunong Berimbu, *Ridley* 13728!; at Kluang Terbang *W. D. Barnes*!—DISTRIB. Borneo (near Kuching, Sarawak, *Haviland* and *Hose* 334!)

This species greatly resembles *A. stenophylla*, Thwaites, a Ceylon species; but differs in the shorter peduncles and the fruit, and especially in the fruiting perianth-tube which has persistent lobes and is more cup-shaped, while in *A. stenophylla* the lobes are deciduous and the tube shallow. *A. stenophylla* also has the midrib of the leaves tawny-villous, while the under-surface in *A. oleifolia* is quite glabrous. The Borneo specimens have rather larger leaves reaching 4—5 cm. in breadth and much less prominently areolate, but otherwise agree.

11. *ACTINODAPHNE CUSPIDATA*, Gamble in Kew Bull. 314 (1910). A tree reaching 12 to 18 m. in height and 20—30 cm. in diam. of stem; branchlets rather thick with greyish or yellowish bark, uppermost rusty-pubescent; shoot-buds perulate, the scales ovate or lanceolate, acuminate. *Leaves* coriaceous, in whorls of about 4; elliptic or elliptic-obovate, long cuspidate-acuminate at apex with a very sharp acumen, attenuate at base; upper surface glabrous, shining, lower glaucous-white with scattered black hairs, the midrib and nerves rusty pubescent; 8—12 cm. long, 4—5 cm. broad; midrib prominent, raised on both surfaces; main nerves 8—10 pairs, irregular, curving upwards to join in loops near the margin; transverse nervules nearly horizontal, enclosing the rather minute reticulation; petiole slender, rusty-pubescent, 1 cm. long. *Flowers* in umbellules in very short rusty-pubescent racemes under 1 cm. long, subterminal or lateral from the internodes between the whorls, supported at the base by chestnut-brown hard ovate acuminate caducous scales; peduncles very short; involucre bracts 4, broadly ovate, enclosing the umbellule of 4 flowers; perianth lobes ovate, obtuse, ciliate, gland-dotted, 2—5 mm. long. *Stamens* of ♂ flowers 9, those of the 1st and 2nd rows 2 mm. long, with oblong anthers and slender villous filaments, those of the 3rd row shorter with a pair of large glabrous, sessile or very shortly stipitate, glands at the base, rudimentary ovary very small; style slender; stigma capitate. *Fruit* and ♀ flowers not known.

PERAK: in dense jungle on hills at 150—250 m. alt. near Ulu Bera, *King's Collector* 10797!

11. *ACTINODAPHNE FRAGILIS*, Gamble in Kew Bull. 315 (1910). A tree reaching 12—18 m. in height and up to 60 cm. in diam. of stem; branchlets rather slender, dark greyish-brown, with longitudinal cracks, glabrous, the ultimate ones minutely puberulous. *Leaves* coriaceous, in whorls of 2—4; ovate or elliptic-ovate, bluntly-acute at apex, acute at base; glabrous on both surfaces, the upper pale brown when dry, the lower white-glaucous; 5—12 cm. long, 2—5 cm. broad; midrib slender, raised on both surfaces; main nerves 5—6 pairs, the lowest pair subopposite, curving to the margin and then joining in loops; transverse nervules and areolate reticulation obscure; petiole slender, 1—2 cm. long, channelled. *Flowers* in umbellules in slender rusty-puberulous pedunculate umbels up to 1 cm. long, lateral on the internodes between the leaves of the uppermost branchlets, the joints easily breaking, glabrous in fruit; involucre bracts very early deciduous; pedicels slender, 2 mm. long; perianth-tube short, with a ring of golden-villous hairs at the mouth within; lobes ovate, ciliate, glabrous within, 1 mm. long. *Stamens* of ♂ flowers not known. *Staminodes* of ♀ flowers very small, clavate, the filaments villous at base, those of the 3rd row with a pair of orbicular glabrous glands. *Ovary* globose; style slender; stigma large, capitate. *Fruit* an ovoid drupe nearly 1 cm. long, 7—8 mm. in diam., seated on the patelliform enlarged perianth-tube 5—6 mm. in diam., its margin entire; pericarp smooth, shining; enlarged pedicel 7 mm. long.

PERAK: in open jungle on tops of hills, Ulu Bubong, 180—280 m. alt., *King's Collector* 10743!, 10904!

13. *LITSEA*, Lamk.

Evergreen or rarely deciduous trees or shrubs; leaf-buds usually without scales. *Leaves* alternate or sometimes opposite or subopposite, penni-nerved. *Flowers* diœcious, in sessile or more usually pedunculate umbellules of several flowers, varying from 2 to 15 but usually 4 to 6, supported by 4 to 6 or rarely more involucre bracts, the outer ones at any rate orbicular concave; umbellules in axillary or lateral (i.e. above leaf-scales or on branches or on the trunk) racemes varying from under 1 cm. long to about 20 cm., the raceme bracts very caducous; flower-pedicels short, sometimes 0; perianth-tube in ♂ flowers 0 or very small, in ♀ flowers funnel-shaped, lobes normally 6 often more sometimes wanting in whole or part, equal or

unequal. *Stamens* in ♂ flowers normally 9 or 12, sometimes more, rarely less (in one species 6), in four rows, those of the two outer rows with eglandular or occasionally 1—2-glandular filaments, those of the 3rd row with biglandular filaments, as are those of the 4th row when present, all the stamens with 4 cells, two cells introrse or the lower pair lateral; ovary 0 or rudimentary with rudimentary style and stigma, very rarely 1-ovuled. *Staminodes* in ♀ flowers normally 9 or 12, etc., as in ♂, those of the outer 2 rows usually clavate or spatulate, those of the inner rows usually shorter subulate or clavate with a pair of glands at their bases; ovary enclosed in the perianth-tube or free, globose or ovoid; style usually thick, often curved; stigma dilated, irregularly lobed. *Fruit* globose, ovoid, ellipsoid or cylindric, resting on the more or less enlarged perianth-tube and supported by the more or less enlarged pedicel; the enlarged perianth-tube sometimes very small and merely supporting the fruit, sometimes obconic or cupular partly enclosing it, sometimes even much enlarged and almost wholly enclosing it; perianth-lobes usually deciduous, occasionally persistent; pericarp usually succulent. *Seed* 1; testa thin; cotyledons conform to the seed, fleshy.—**DISTRIB.** Tropical and subtropical Asia, in India, Burma, the Malayan Peninsula and Archipelago eastwards to Japan, south to the Pacific Islands, Australia and New Zealand; scarce in Africa and America: species from 150 to 200.

In preparing the following key, I have reluctantly been obliged to abandon the idea of arranging the species under the old subgenera having found the task almost impossible. However, in avoiding characters taken from the flowers and relying chiefly upon those of the leaves, inflorescence and fruit, I think I may have made it more easy to follow in the field, where a worker can only very rarely have at his command specimens of both ♂ and ♀ plants as well as of the fruit. It may not be out of place to sound a note of warning as to the fruit; the enlarged perianth forming the cupule varies greatly as it develops gradually to maturity; and mature specimens are quite necessary for proper identification. The flowers in this genus are very variable but in a single umbellule there are usually one or two flowers with the normal number of parts, the rest frequently varying considerably from them, the central flower often having more than the normal number.

I need say little on the reasons for the adoption of *Litsea*, Lamk., as the generic name; for the subject was fully gone into first by Jussieu in the *Annales d'Hist. Nat.* VI. 197 who fixed on *Litsea*, and by Blume in *Mus. Bot. Lugd.-Bat.* I. 371 who decided to adopt *Tetranthera*, Jacq., and afterwards by Bentham and Hooker in the *Gen. Pl.* III. 162 who showed that *Litsea*, Lamk., was the correct name. They have been followed in this by Pax in *Engler and Prantl Naturl. Pflanzenfam.* III. 2. 199.

Leaves alternate. (Nos. 1-48.)

Leaves hairy on the lower surface. (Nos. 1-12.)

Perianth-lobes incomplete or 0; tomentum grey

Umbellules in pedunculate umbels or corymbs up to 5 cm. long; leaves usually obtuse .. 1. *L. chinensis*.

Umbellules in almost sessile clusters; leaves short-acuminate 2. *L. tomentosa*.

Perianth-lobes complete; tomentum usually more or less reddish. (Nos. 3-12.)

Umbellules on woody tubercles from the trunk of the tree

Leaves under 30 cm. long, 10 cm. broad, purplish-red beneath 3. *L. johorensis*.

Leaves over 30 cm. long, 10 cm. broad, rusty-tomentose beneath .. 4. *L. trunciflora*.

Umbellules in clusters or racemes on the branchlets. (Nos. 5-12.)

Leaves coriaceous, obovate, usually very large, nerves and nervules very strong; branchlets very stout

* Umbellules peduncled, in short thick racemes scarcely 1 cm. long; leaves rusty beneath .. 5. *L. grandis*.

Umbellules sessile, in racemes 4-6 cm. long; leaves greyish beneath 6. *L. artocarpifolia*.

Leaves subcoriaceous, lanceolate, rather small, nerves and nervules strong, branchlets moderately stout .. 7. *L. firma*.

Leaves chartaceous or membranous, small to moderate-sized

Umbellules in short clusters. (Nos. 8-11.)

Branchlets very slender; leaves oblong-lanceolate; umbellules sessile, in clusters of only 2-3.. .. 8. *L. gracilis*.

Branchlets moderately stout
Leaves elliptic-lanceolate; umbellules in many-flowered fascicles; fruit ovoid; fruiting perianth very small 9. *L. amara*.

Leaves broadly elliptic or orbicular.

Leaves elliptic, ovate or orbicular, strongly nerved, densely rufous

- hirsute; umbellules in clusters of 3—4 .. 10. *L. hirsutissima*.
- Leaves elliptic or elliptic-oblong, sparsely grey-or tawny-pubescent; umbellules in dense clusters .. 11. *L. polyantha*.
- Umbellules in racemes reaching 10—16 cm in length; leaves cordate; fruit oblong; fruiting-perianth obconic, very small .. 12. *L. cordata*.
- Leaves glabrous or only slightly hairy on the lower surface. (Nos. 13—48.)
- Umbellules in clusters or short racemes (in 15 *L. brachystachya* panicked). Nos. 13—36.)
- Fruit small, under 7 mm. in diameter; fruiting perianth very small, scarcely enlarged. (Nos. 13—15.)
- Umbellules in clusters or very short racemes under 1 cm. long
- Leaves membranous, lanceolate, strongly scented .. 13. *L. citrata*.
- Leaves chartaceous, more or less elliptic, long-petioled .. 14. *L. petiolata*.
- Umbellules in panicles of racemes reaching 4—10 cm. in length, leaves elliptic, chartaceous .. 15. *L. brachystachya*.
- Fruit oblong, 2 cm. by 1 cm., pedicel long, clavate; leaves coriaceous; fruiting perianth small, flattened. 6 mm. in diameter .. 16. *L. angulata*.
- Fruit moderate-sized, about 1 cm. in diam., pericarp thin; fruiting perianth chartaceous, cleft; leaves submembranous, rather large, glaucous beneath .. 17. *L. spathacea*.
- Fruit moderate-sized, 8—15 mm. in diam.; fruiting perianth cup-shaped bearing the remains of the lobes and staminodes. (Nos. 18—19.)
- Leaves oblanceolate, 23—43 cm. long, nearly glabrous, pergamaceous; fruiting perianth thin; umbellules in clusters on branches below leaves .. 18. *L. magnifica*.
- Leaves elliptic-oblong under 25 cm. long; fruiting perianth thick; umbellules in clusters among the leaves or below them
- Leaves chartaceous, young slightly pubescent, transverse nervules prominent; peduncles of

- umbellules slender, up to 12
mm. long 19. *L. Ridleyi*.
- Leaves coriaceous, young softly
tomentose, transverse nervules
obscure; peduncles of umbel-
lules thick, under 5 mm. long.. 20. *L. penangiana*.
- Fruit moderate-sized to large; fruiting
perianth with entire margins, the lobes
and staminodes deciduous. (Nos. 21-29.)
- Leaves more or less elliptic, usually
over 20 cm. long; fruiting perianth
thick, cup-shaped; umbellules axil-
lary or lateral among the leaves
or a little below them
- Fruit ovoid; fruiting perianth not
spotted, rather large and long-
pedicelled; leaves chartaceous,
more or less ovate, dark red-
dish-brown when dry, under 10
cm. broad 21. *L. castanea*.
- Fruit ellipsoid-oblong, 2 cm. by 1
cm.; fruiting perianth smooth,
with short pedicels; leaves
coriaceous, more or less ovate,
under 4 cm. broad .. 22. *L. quercina*.
- Fruit cylindric-oblong, 2 cm. by
under 1 cm.; fruiting perianth
rough, with short pedicels;
leaves coriaceous, more or less
obovate, 4—9 cm. broad .. 23. *L. cylindrocarpa*.
- Leaves more or less oblong, 15—30
cm. long or more; fruiting perianth
thick, cup-shaped or saucer-shaped,
spotted; umbellules axillary or
lateral among the leaves or below
them, flowers scarcely known
- Leaves elliptic-oblong or oblong-
lanceolate, 3—5 cm. broad,
reddish beneath, transverse
nervules and reticulation vis-
ible; fruit globose, 10 mm. in
diam. with a large spotted cup 24. *L. Wrayi*.
- Leaves oblong-lanceolate, 4—7
cm. broad, transverse nervules
and reticulation obscure; fruit
globose, apiculate, 16 mm. in
diam., pedicel short .. 25. *L. singaporensis*.
- Leaves oblong-obovate or -ob-
lanceolate, 5—8 cm. broad,

- transverse nervules and reticulation faint; fruit globose, apiculate, 10 mm. in diam., pedicel long .. 26. *L. perakensis*.
- Leaves elliptic-oblong, 8—14 cm. broad, transverse nervules and reticulation faint; fruit globose, 15 mm. in diam. .. 27. *L. pustulata*.
- Leaves subcoriaceous, oblong or obovate, glaucous beneath, 20—40 cm. long; fruiting perianth patelliform, 10—12 mm. in diam. supporting the globose fruit, 15 mm. in diam. .. 28. *L. patellaris*.
- Leaves pergamaceous, oblong-obovate, 15—35 cm. long, subglaucous beneath; fruiting perianth very large and woody enclosing the globose fruit .. 29. *L. fenestrata*.
- Fruit wanting. (Nos. 30-37.)
- Leaves elliptic, nerves prominently parallel, close, more than 8 pair.
- Leaves cuspidate-acuminate; racemes grey-pubescent .. 30. *L. Foziana*.
- Leaves acute or acuminate only; racemes nearly or quite glabrous .. 31. *L. monticola*.
- Leaves oblong-lanceolate or oblanceolate, nerves distant and somewhat irregular (Nos. 32-37).
- Leaves lanceolate, long acuminate, areolate; racemes 3—5 mm. long .. 32. *L. Scortechinii*.
- Leaves oblanceolate, greyish-subglaucous beneath, usually under 6 cm. broad, apex with an acumen
- Upper surface of leaves dark; racemes 8—15 mm. long, peduncles 10—12 mm. long .. 33. *L. ochracea*.
- Upper surface of leaves pale; racemes under 7 mm. long, umbellules sessile .. 34. *L. oblanceolata*.
- Leaves oblong-lanceolate, subglaucous beneath; usually over 6 cm. broad, apex rounded; involucre densely grey-puberulous .. 35. *L. Kunstleri*.

Leaves elliptic-lanceolate or -oblan-
ceolate, acuminate, glaucous be-
neath, nerves distant, 6 pairs;
umbellules subglabrous, peduncles
10—20 mm. long .. 36. *L. claviflora*.

Leaves ovate or elliptic, scarcely 10
cm. long, nerves 4—6 pairs; ped-
uncles glabrous 5 mm. long .. 37. *L. Helferi*, var.
ovata.

Flowers in elongated racemes (in 38 *L. myristicæfolia*
scarcely over 2 cm. long. (Nos. 38—48.)

Leaves narrow, rarely over 7 cm. broad or 20
cm. long, more or less glabrous. (Nos. 38—41.)

Racemes short, glabrous; leaves coria-
ceous; fruiting perianth fleshy, near-
ly at right angles with the long
peduncle, half enclosing the globose
fruit 8 mm. in diam. .. 38. *L. myristicæfolia*.

Racemes moderately long, glabrous

Leaves coriaceous elliptic-oblong,
abruptly acuminate; racemes
2—5 cm. long; fruiting peri-
anth cup-shaped to flattened;
fruit ovoid to globose, 15—18
mm. in diam. .. 39. *L. Teysmanni*.

Leaves coriaceous, oblong-lanceo-
late, long acuminate; racemes
7—9 cm. long; fruiting peri-
anth hemispheric on an enlarged
clavate pedicel and half enclos-
ing the globose fruit 10 mm. in
diam. .. 40. *L. machilifolia*.

Racemes up to 17 cm. long, pubescent;
leaves chartaceous, oblong-lanceo-
late, puberulous beneath .. 41. *L. Panamonja*.

Leaves broad. (Nos. 42—48.)

Racemes glabrous

Leaves submembranous, elliptic;
racemes 10—25 cm. long;
branchlets angular, almost wing-
ed; fruit not known .. 42. *L. Curtisii*.

Leaves coriaceous, oblanceolate;
racemes 10 cm. long; branch-
lets rounded; fruit depressed-
globose enclosed in a woody
nest-like cupule about 2 cm.
in diam. .. 43. *L. nidularis*.

Racemes puberulous, up to 15 cm.
long; leaves coriaceous, elliptic-

obovate, up to 45 cm. long and 20 cm. broad; fruit globose 2.5—3 cm. in diam. on a saucer-shaped cupule 25 mm. in diam. .. 44. *L. megacarpa*.
 Racemes tomentose or pubescent. (Nos. 45—48.)

Racemes rather short, up to 10 cm. long; leaves coriaceous, oblong-lanceolate with broad midrib; fruiting perianth obconic, 25—30 mm. in diam. .. 45. *L. sebifera*.

Racemes long, reaching 16—20 cm. Leaves coriaceous, glabrous, oblong or oblanceolate; petiole 4—7 cm. long .. 46. *L. Maingayi*.

Leaves scarcely coriaceous, elliptic-oblong, under surface pubescent; petiole under 4 cm. long

Leaves reddish beneath; fruiting perianth cup-shaped, smooth, 15—20 mm. in diam.; stamens sometimes 6 only .. 47. *L. Noronhæ*.

Leaves greyish beneath; fruiting perianth saucer-shaped, pustulate, 27 mm. in diam. .. 48. *L. robusta*.

Leaves opposite or subopposite, sometimes alternate. (Nos. 49—55.)

Leaves more or less elliptic-lanceolate, under 20 cm. long, 6 cm. broad, glabrous or slightly pubescent.

Leaves long-cuspidate-acuminate; main nerves 5—7 pairs .. 49. *L. sarawacensis*.

Leaves obtuse, acute or only shortly acuminate.

Leaves membranous or chartaceous, main nerves 8—12 pairs; fruit ellipsoid, 5 mm. in diam.; fruiting perianth very small with persistent lobes .. 50. *L. lancifolia*.

Leaves pergamaceous, main nerves 6—8 pairs; fruit cylindric-oblong, 6—7 mm. in diam.; fruiting perianth 7 mm. in diam., lobes deciduous .. 51. *L. gracilipes*.

Leaves obovate-oblong or -oblanceolate, grey- or rusty-pubescent or -tomentose

Leaves membranous to chartaceous, grey-pubescent beneath; transverse nervules and reticulation obscure .. 52. *L. ujongensis*.

Leaves chartaceous, rusty-pubescent beneath,

- transverse nervules and reticulation prominent 53. *L. sessiliflora*.
 Leaves coriaceous, rusty-tomentose beneath, transverse nervules and reticulation obscure.
 Umbellule-peduncles 5—10 mm. long; fruiting perianth saucer-shaped, thin, 10—20 mm. in diam.; leaf-tomentum dark brown when dry 54. *L. ferruginea*.
 Umbellule peduncles 10—20 mm. long; fruiting perianth cup-shaped, thick, 17 mm. in diam.; leaf-tomentum light brown when dry 55. *L. Griffithii*.

1. *LITSEA CHINENSIS*, Lam. Encyc. Méthod. III. 574 (1789).
 A small or moderate-sized evergreen tree of variable leaves and inflorescence, pubescence, etc.; branchlets terete, glabrescent; buds perulate, densely silky tawny-pubescent as are the innovations. *Leaves* chartaceous or thinly coriaceous, alternate or subopposite or subverticillate at the ends of the branchlets; lanceolate or oblong or elliptic, sometimes even ovate or obovate, acute or obtuse at apex, usually acute at base; upper surface somewhat shining, closely but markedly minutely reticulate, glabrous except on the midrib, olive green when dry, lower surface paler and varying from glabrous to densely grey-pubescent; 10—25 cm. long, 4—10 cm. broad; midrib broad, pubescent; main nerves about 8—10 pairs, often branched; transverse nervules irregular and distant; reticulation minutely netted; petiole 1—3 cm. long, grey-pubescent to glabrous. *Flowers* in umbellules, in axillary or lateral pedunculate umbels or corymbs up to 5 cm. long, the ♀ rather shorter than the ♂; umbels of 2—5 umbellules on peduncles 5 mm. (♀) to 12 mm. (♂) long; umbellules 12 mm. broad (♂), half that size (♀) with 4 concave pubescent involucre bracts the outer pair orbicular, the inner narrower; flowers in each umbellule about 10 to 12, fewer and much smaller in ♀ than in ♂; pedicels about 2 mm. long; perianth-tube short; perianth-lobes incomplete, sometimes 0, rarely more than 2 or 3, when present linear or spatulate, pubescent. *Stamens* of ♂ flowers normally 12, sometimes fewer, sometimes up to 15 or even more, those of outer rows 10 mm. long, on slender villous filaments and with subquadrate anthers; those of inner rows rather shorter and with a pair of long-stalked clavate glands attached at the very base of the filaments; rudimentary ovary often 0, when present conical and very small. *Staminodes* of ♀ flowers normally 12 sometimes fewer, often more, those of outer rows spatulate, 2 mm. long, with villous filaments,

those of inner rows similar with long-stalked clavate glands as in ♂. Ovary ovoid, glabrous; style long, thick; stigma peltate, often lobed. Fruit small, 7—10 mm. in diameter, globose, seated on the very slightly enlarged flattened tube of the perianth, about 2 mm. broad; pericarp thin, black or purple; cotyledons hemispherical. Trimen Fl. Ceyl. III. 449; Cooke Bomb. Fl. II. 539; Koord. & Val. Bijdr. X. 134. *L. sebifera*, Pers. Syn. II. 4 (1807); Hook. f. Fl. Br. Ind. V. 157; Prain Beng. Plants 902; Brandis Ind. Trees 536. *L. multiflora*, Bl. Bijdr. II. 564 (1825). *L. glabraria* and *lævis*, Juss. in Ann. Mus. VI. 212. *L. geminata*, Bl. Bijdr. 564. *L. tetranthera* and *platyphylla*, Pers. l.c. *Tetranthera laurifolia*, Blume Mus. Bot. Lugd.-Bat. I. 372; Nees in Wall. Pl. As. Rar. II. 66, III. 30; Meissn. in DC. Prodr. XV. 1. 178; Roxb. Fl. Ind. III. 823; Bot. Reg. t. 893; Wall. Cat. 2550 C. and 2555 A.D.; Brandis For. Fl. 379; Kurz For. Fl. II. 297; Benth. Fl. Austral. V. 305. *T. Roxburghii*, Nees l.c. 65. and 30 and Syst. 515. *T. apetal*a, Roxb. Cor. Pl. II. 25. t. 147 and Fl. Ind. III. 819; Gaertn. f. Fruct. III. 226. t. 222; Wall. Cat. 2554 B. and C. *T. litoralis*, Bl. l.c. 375. *T. glabraria*, *lævis* and *geminata*, Nees Syst. Laur. l.c. *T. tomentosa*, Nees in Wall. l.c. 65 and Syst. Laur. 511. *Glabraria tersa*, Linn. Mant. 276; Miq. Fl. Ind. Bat. 941; *G. litoralis*, Miq. l.c. 943. *Tomex tetranthera* and *sebifera*, Willd. Sp. Pl. II. 839, 840. *Sebifera glutinosa*, Lour. Fl. Cochinch. II. 783. *Laurus involucrata*, Koenig in Retz. Obs. VI. 27.

Malay Peninsula, *vide* Hook. f. in Fl. Br. Ind.; Koord. & Val., etc.—DISTRIB. India, Burma, Ceylon, Andaman Islands, Malay Islands, China, Australia.

There are no specimens of this species from our area in the Kew or Calcutta or Singapore Herbaria; but it seems best to include the description. I have been in doubt whether I should not follow Merrill and call it *L. tersa*, Merrill, in Philipp. Journ. of Sc. I. 57 (1906); but after much consideration have preferred to leave it under the better known name adopted by such authorities as Trimen, Cooke and Koorders & Valetton.

2. *LITSEA TOMENTOSA*, Blume Bijdr. 566 (1825). A tree reaching 15—20 m. in height and a diameter of bole of 45 to 60 cm.; branchlets stout, rough, puberulous, uppermost and innovations tawny-pubescent; buds oblong. Leaves membranous when young, chartaceous when older, obovate or oblong-obovate, abruptly short-acuminate at apex, cuneate at base; upper surface shining, puberulous when young, afterwards glabrous except on the midrib and main nerves, lower surface minutely grey-tawny-pubescent; 12—20 cm. long, 4—10 cm. broad; midrib stout, broad, pubescent; main

nerves 12—15 pairs, straight at first afterwards curved near the margin; transverse nervules prominent in old leaves, reticulation minutely netted; petiole 2—3 cm. long, stout, tawny-pubescent. *Flowers* in umbellules, in dense axillary or lateral bracteate clusters on a very short stout common peduncle about 5 mm. long; bracts oblong, densely grey-pubescent without; umbellule-peduncles thick, grey-pubescent, 5 mm. long; involucre bracts 4, orbicular, concave, grey-pubescent without, glabrous within, about 4 mm. in diam.; flowers in umbellule 5, on short pedicels 2 mm. long; perianth-lobes small, incomplete, ovate-acute or sublinear, sometimes missing. *Stamens* of ♂ flowers "20—24 slightly longer than the perianth lobes, with villous filaments; glands about 8—12, obconic, stipitate, hidden in the villous hairs of the tube; rudimentary ovary small glabrous; stigma 0." *Staminodes* of ♀ flowers many (up to 30) densely imbedded in stiff tawny hairs; those of outer rows spathulate on slender villous filaments, those of inner rows with a pair of stalked clavate glands inserted at the bases of the filaments. *Ovary* ovoid; style thick; stigma large, peltate, often lobed. *Fruit* "ellipsoid, obtuse, about 3 cm. long, 1.5—2.5 cm. broad, seated on the cupular enlarged perianth-tube 2 cm. broad 3 mm. high, the margin irregularly 9—12-toothed or subentire; pedicel obconic, 1.5—2.5 cm. long, often much incurved." Koord. & Val. Bijdr. X. 133. *Tetranthera vestita*, Nees Syst. Laur. 551; Blume Mus. Bot. Lugd.-Bat. I. 372; Meissn. in DC. Prodr. XV. i. 178. *Glabraria vestita*, Miq. Fl. Ind. Bat. I. 941. *Polyadenia grandis*, Hassk. Cat. Bog. 566, non Nees.

PENANG: at West Hill, 75 m. alt., Curtis 1182!; in dense jungle at Larut 90—150 m. alt., King's Collector 5886!—DISTRIB. Java.

The leaves of Curtis specimens are thicker and stouter than those of Kunstler, but they are older; and the inflorescence (♀ in both) is the same. This is apparently the oldest use of the specific name *tomentosa*: the S. Indian *L. tomentosa*, Wall. Cat. 2550 will have to be called *L. apetalá*. The descriptions of the stamens (♂) and fruit are taken from Koorders and Valetton. The Javan specimen in Herb. Kew (♀) has the leaves rather broader and more obovate than is the case with the Peninsular ones; but in other respects it agrees, and I see no reason to doubt the identification.

3. *LITSEA JOHORENSIS*, Gamble in Kew Bull. 315 (1910). A small evergreen tree with smooth white bark; branchlets grey, rather slender, the uppermost densely red-brown-tomentose as are the lanceolate buds, the petioles and undersurface of the leaves and the inflorescence. *Leaves* coriaceous, alternate, somewhat crowded to-

wards the ends of the branchlets; oblanceolate, acuminate usually abruptly at apex, long attenuate at base; upper surface dark brown and dull when dry, glabrous except the puberulous midrib and main nerves, areolate reticulate, lower sparsely tomentose purplish-red when dry; 10—30 cm. long, 4—10 cm. broad; midrib rather slender, impressed above; main nerves 10—14 pairs impressed above, starting at about 70° with the midrib and at once curving upwards to and along the margin; transverse nervules rather irregular and branched, not very prominent, enclosing the areolate reticulation; petiole rather slender from a thickened base, channelled above, 1.5—3.5 cm. long. *Flowers* in umbellules on slender tomentose peduncles 15 mm. long (♂) several together on hard woody tubercles with rugosely scarred cylindric branches up to 18 mm. long on the tree-trunk; the umbellules when open reaching 15 mm. in diam. (♂), or 10 mm. (♀); involucral bracts 4—5, orbicular, concave, tomentose without, glabrous within; flowers in each umbellule 6—7, subsessile; perianth-lobes 6, oblong or spatulate, obtuse, sparsely villous, 5—7 mm. long, much gland-dotted. *Stamens* of ♂ flowers variable in number, normally 9, but often 10, those of the outer rows up to 9 mm. long with large 3 mm. long oblong anthers and slender slightly villous filaments, sometimes with 1 or 2 small glands at the base, those of the inner row shorter and with a pair of reniform and usually emarginate shortly stipitate glands at the base itself; anther-cells very large, elliptic-oblong, the upper introrse, the lower lateral; rudimentary ovary ovoid; style thick; stigma spreading, bifid. *Staminodes* of ♀ flowers variable in number, normally 9 but often up to 12, those of the outer rows linear subulate, slender, slightly villous, 3 mm. long, sometimes with glands at their bases; those of the inner rows triangular-acuminate with 2 large basal glands, 1 mm. long. *Ovary* ovoid, glabrous; style thick, curved; stigma large, peltate, irregularly lobed. *Fruit* (immature) ovoid, truncate at apex, apiculate, half-enclosed in the hemispheric rough persistent perianth-tube 6 mm. long and 10 mm. in diam. at the mouth which is entire or lobed and bears remains of the perianth-lobes and staminodes; enlarged pedicel very stout, short; pericarp smooth.

JOHORE: at Tanyong Bunga, *Ridley* 6458!, near Castlewood, *Ridley* 9163!, at the Mount Austen, *Ridley* 11995!, at Seduah, *Ridley* 13479!

This species comes rather near to *L. cauliflora*, Stapf in Trans. Linn. Soc. 2nd Ser. IV. 219 collected by Haviland on Mt. Kinabalu in Borneo at 5000 ft.,

but the venation of the leaves is different and the umbellules are much larger. The specimens of the ♀ flowers and young fruit were found separate with Ridley's No. 6458 which is otherwise ♂; they must have been collected on a different tree.

4. *LITSEA TRUNCIFLORA*, Gamble in Kew Bull. 316 (1910). A handsome evergreen tree reaching 18 m. in height and 30—40 cm. in diam. of stem; bark of stem greyish-brown, smooth; branchlets rather stout, pale brown, the uppermost and lanceolate buds and the petioles of the leaves dark brown rusty-tomentose. *Leaves* chartaceous, alternate; obovate or oblanceolate, rounded or emarginate at apex, long-cuneate-attenuate at base; upper surface shining, glabrous except the villous midrib, areolate-reticulate, lower blue-green when fresh, pale grey-brown when dry, softly rusty-tomentose especially on the nerves; margin recurved; 28—56 cm. long, 11—22 cm. broad; midrib very stout, impressed above, much raised beneath; main nerves 16—22 pairs, impressed above, prominent beneath, often branched and with secondary nerves between, starting usually at from 70°—80° or sometimes at right angles to the midrib, at first straight but curving near the margin to meet in irregular loops; transverse nervules distant, irregular, often branched, prominent, enclosing the areolate reticulation which is best seen on the upper surface; petiole very stout, flattened above, 1.5—2.5 cm. long. *Flowers* in umbellules on rather slender pubescent peduncles 10—15 mm. long (♂) 7—8 mm. (♀) many together on hard thick woody tubercles on the tree-trunk, the clusters about 5 cm. in diam.; umbellules (♂) 10—12 mm. in diam. when open; involucrel bracts 4, orbicular, concave, minutely puberulous without, glabrous within; flowers in each umbellule 4—5, sessile; perianth-lobes 6, very variable, mostly linear-oblong, toothed at the apex, sparsely villous, gland-dotted, 5—6 mm. long. *Stamens* of ♂ flowers variable in number, usually 9 or 12; those of the outer rows 7—8 mm. long with oblong anthers and very slender villous filaments, sometimes with glands at the base; those of the inner rows shorter and with a pair of rounded often emarginate very shortly stipitate glands close to the base; anther-cells very large, elliptic, upper all introrse, lower lateral; rudimentary ovary ovoid; style slender, much curved, glabrous; stigma large, peltate, bifid. *Staminodes* of ♀ flowers apparently all with basal glands, outer linear-clavate, villous, 3 mm. long, inner shorter, the glands thick. *Ovary* ovoid; style slender, straight; stigma peltate. *Fruit* (very unripe) depressed globular, enclosed almost completely in the turbinate enlarged perianth-tube

which when young is nearly globular with a small orifice bearing remains of the perianth-lobes and staminodes.

PERAK: open jungle in Goping District at 150—300 m. alt., *King's Collector* 4582!, 8211! *Herb. Singap.* No. 448 (♀)! Vern. 'Suko Medang Kunit', without locality.

This species, to judge by leaf-specimens, which is all that is available (in *Herb. Calc.*) of *Tetranthera? ochrascens*, Miq. *Fl. Ind. Bat. Suppl.* I. 146, 363, comes very near that species; but the venation does not fully agree.

5. *LITSEA GRANDIS*, Hook. f. in *Fl. Br. Ind.* V. 162 (1886). A large tree reaching 25 to 30 m. in height and 60—90 cm. diam. of stem; bark warted; branchlets very stout, angular, the upper ones densely tawny-tomentose; buds ovoid, 1—3 cm. long, velvety. *Leaves* coriaceous, alternate; broadly obovate or orbicular-ovate or -obovate, generally obtuse but sometimes acute or shortly acuminate at apex, attenuate or rounded or sometimes subcordate at base; upper surface dull or shining, glabrous except the midrib and main nerves, lower densely rusty-tomentose; margins recurved; 10—30 cm. long, 5—18 cm. broad; midrib very stout, flat and tomentose above or sometimes impressed, prominent beneath; main nerves 12 to 20 pairs, divergent from the midrib at from 60°—70°, straight to near the margin where they curve upwards, deeply impressed above, raised beneath; transverse nervules very many and prominent, regular, ladder-like; reticulation in the intervals again more or less transverse; petiole very stout, 2—4 cm. long. *Flowers* in pedunculate (7—15 mm.) umbellules in short (up to 10 mm.) axillary or lateral thick racemes of about 10; involucre bracts 5, orbicular, concave, densely greyish silky tomentose without; open umbellules 10 mm. broad in ♂, 7—8 mm. in ♀; flowers in each umbellule 5—7 in ♂, 4—5 in ♀; pedicels stout; perianth-tube short, lobes linear-oblong in ♀, lanceolate-acute in ♂, silky, about 4 mm. long, 6—8 in ♂, fewer in ♀. *Stamens* in ♂ flowers normally 12, but frequently more, up to 21; those of the 2 outer rows normally eglandular, but frequently with 1 or more stipitate glands, anthers short truncate at base, rounded above, filaments very slender, sparsely strigose, 3—4 mm. long; those of the inner rows shorter and with a pair of small clavate stipitate glands at the base; upper anther-cells introrse, lower lateral; rudimentary ovary 0. *Staminodes* of ♀ flowers normally 12; those of outer rows clavate, 2 mm. long, the filaments villous; those of inner rows linear and with a pair of shortly-stalked small glands at the base. *Ovary* ovoid, glabrous; style thick, bent

to a hook at the top; stigma peltate, lacerate. *Fruit* ellipsoid, 11—16 mm. long, 8—10 mm. broad, seated on the obconical thin enlarged perianth-tube, 5—7 mm. high, 8 mm. in diam., the margins sharp, entire crenulate or sometimes cleft; pedicels much thickened, 6 mm. long; pericarp yellowish, shining, smooth, glabrous. Brandis Ind. Trees 537. *Tetranthera grandis*, Wall. Cat. 2552; Meissn. in DC. Prodr. XV. 1. 188; Kurz. For. Fl. II. 299. *Polyadenia grandis*, Nees in Wall. Pl. As. Rar. II. 62 and Syst. Laur. 574.

PENANG: *Porter* (Wallich 2552)!; on Government Hill, *Curtis* 1104!. PERAK: at Lower Camp, Gunong Batu Pateh, *Wray* 1100!, 1157!; in hilly country at 150—300 m., *King's Collector* 5888!, 10918! MALACCA: *Maingay* K. D. 1256!. SINGAPORE: at Chanchukang, Changi, Bukit Timah, etc. *Ridley* 3962!, 4700!, 5062!, 5974!, 5975!, 6452!, 10698!, 10802!, 10859!; *Cantley* 116!—DISTRIB. Burma, Java?

6. *LITSEA ARTOCARPIFOLIA*, Gamble in Kew Bull. 316 (1910). An evergreen tree; branchlets very stout, rough, brown, marked with lenticels and large leaf-scars, uppermost and large ovate-lanceolate buds densely rusty-pubescent. *Leaves* coriaceous, alternate; obovate, obtuse or slightly apiculate at apex, attenuate at base; upper surface shining, glabrescent except on the midrib and nerves, lower surface grey, closely rusty-pubescent; margin recurved; 20—25 cm. long, 9—12 cm. broad; midrib stout, very broad (4 mm. near base) depressed above, much raised beneath; main nerves about 20 pairs, regular, parallel, impressed above, prominent beneath, at about 60°—70° with the midrib, at first straight then curving to join the margin; transverse nervules many, prominent, straight or branched; reticulation obscure; petiole very stout, 10—15 mm. long, channelled above. *Flowers* in sessile or very shortly peduncled umbellules, closely packed in rusty-pubescent racemes 4—6 cm. long from the axils of fallen leaves on the last shoot; umbellules (♂ only) when open 15 mm. in diam.; involucral bracts 5, orbicular, concave, enclosing 6 flowers; pedicels stout, villous, 4 mm. long; perianthlobes 6—8, oblong-lanceolate, acuminate, silky-villous on both sides, 5 mm. long. *Stamens* of ♂ flowers 9—15, apparently normally 12, of which those of the outer rows 8 mm. long, eglandular or sometimes with glands; those of the inner rows a little shorter, and furnished with a pair of large reniform often emarginate stipitate glands a little above the bases of the villous slender filaments; anthers obovate, the upper cells introrse, the lower lateral; rudimentary

ovary 0 or very small with small capitate stigma. *Staminodes* of ♀ flowers and *fruit* not known.

PERAK: at Relan Tujur, *Wray* 2233 !.

In leaf this species resembles *L. grandis* but differs in the much longer racemes, the nearly sessile umbellules, the broader leaf-midrib and other points.

7. *LITSEA FIRMA*, Hook. f. in Fl. Br. Ind. V. 162 (1886). A very large tree, reaching a height of 30—40 m. and a diameter of 1 metre or more; branchlets moderately stout, greyish-brown, the uppermost and innovations minutely rusty puberulous; buds lanceolate, not perulate. *Leaves* subcoriaceous, alternate; oblong-lanceolate or oblanceolate, obtuse or acute, rarely acuminate at apex, cuneate often unequally at base; upper surface dull, glabrous, reddish-brown, lower minutely reddish or greyish rusty-puberulous, at length glabrous; 8—18 cm. long, 3—5 cm. broad; midrib moderately stout, somewhat channelled on the upper surface, much raised on the lower; main nerves 10—15 pairs, rather irregular, curving upwards to and along the margin, more or less impressed above; transverse nervules many and conspicuous on the under surface, often branched or irregular; reticulation areolately pitted on the upper surface (under the lens); petiole 1—2 cm. long, rather slender. *Flowers* in peduncled (5—7 mm.) umbellules in rusty-pubescent axillary or lateral umbelliform racemes of about 5—6; umbellules in ♂ about 7 mm. in diameter with 4—6 concave orbicular involucre bracts; flowers in umbellule 5—6, shortly pedicelled; perianth-tube in ♂ very short; lobes oblong, tawny-villous, 2—3 mm. long, subacute, those of ♀ slightly smaller. *Stamens* in ♂ flowers 9, those of the 2 outer rows eglandular 6—8 mm. long, with long filiform sparsely hispid filaments and oblong anthers, those of the inner row similar or rather shorter with smaller anthers and a pair of reniform stipitate glands at the bases of the filaments; lower anther-cells lateral, upper large and introrse in the outer rows, minute or even wanting in the inner row; rudimentary ovary 0. *Staminodes* of ♀ flowers linear, subulate, with hispid filaments 2—3 mm. long, the inner three with a pair of reniform stipitate glands at the base. *Ovary* not seen. *Fruit* ovoid-oblong, truncate at apex, 10—12 mm. long, 8 mm. broad, seated on the shallow obconic enlarged perianth-tube 3 mm. high, 6—7 mm. in diameter; enlarged pedicel stout, 5 mm. long; pericarp pink when ripe, smooth. *Tetranthera firma*, Blume Mus.

Bot. Lugd.-Bat. I. 381; Meissn. in DC. Prodr. XV. 1. 190; Miq. Fl. Ind. Bat. I. 950.

PERAK: hills near Larut at 120—180 m. alt., *King's Collector* 6772!, 7931!. MALACCA: *Maingay* K. D. 1271!; *Kofar Ali* 4!. SINGAPORE: at Bukit Timah, *Ridley* 6453!, at Chauchukang 6820!—DISTRIB. Sumatra, at Bigin Telok, 150 m. alt., *Forbes* 3239!; Borneo, *Korthals*; Celebes.

Ridley's specimens have the leaves more rusty-puberulous and the young fruit cupules nearly globose with small orifice, but the orifice widens later on to a shallow cup; and I see no reason to doubt their identity.

8. *LITSEA GRACILIS*, Gamble in Kew Bull. (1910). A small tree; branchlets very slender, densely tawny-pubescent, innovations silky. *Leaves* membranous, alternate; oblong-lanceolate, acuminate at apex, attenuately acute at base; upper surface shining, glabrous except on the midrib; lower sparsely villous, closely so on the midrib and main nerves; 8—14 cm. long, 2—4 cm. broad; midrib slender, slightly impressed above; main nerves 8—10 pairs, starting at about 70° with the midrib and curving at once upwards to and along the margin and breaking up in small diminishing loops; transverse nervules irregular, branched; reticulation obscure; petiole slender, 4—5 mm. long. *Flowers* in small pale brown umbellules on very slender short (.3 to .4 mm.) peduncles, 2—3 together in the axils of upper leaves; umbellules of ♂ 4 mm. in diam. in flower; involucre bracts 4, straw-coloured, membranous, villous without, glabrous within, ovate, concave; flowers in each umbellule 3, pedicels minute; perianth-lobes very thin, obovate, villous outside, gland-dotted, 1—1.5 mm. long in ♂, under 1 mm. in ♀. *Stamens* of ♂ flowers 9, exsert, those of the outer rows 6, nearly 2 mm. long with small obovate anthers and slender long-pilose filaments; those of the inner row 3, similar but shorter and with a pair of rounded subsessile glands at the bases of the filaments; rudimentary ovary 0. *Staminodes* of ♀ flowers 9, minute, those of the outer rows 6, clavate, with pilose filaments, those of the inner row 3 subulate with a pair of rounded glands at the base. *Ovary* globose; style thick, curved; stigma peltate, 3-lobed. *Fruit* (unripe) obovoid, apiculate, seated on the thick enlarged perianth-tube, the lobes and staminodes persistent.

PERAK: at Temango, *Ridley* 14603! (both ♂ and ♀ branches).

A very interesting and pretty species, which looks as if it were deciduous,

but there is no information about this. The flowers are very small and delicate.

9. *LITSEA AMARA*, Blume Bijdr. 563 (1825). An evergreen shrub or small tree reaching at most 12—15 m. in height and 30—40 cm. in diam. of stem; branchlets moderately stout, somewhat angled and sinuate, the uppermost and innovations rusty-tomentose. *Leaves* chartaceous when dry, alternate, very variable in shape and pubescence; elliptic or elliptic-lanceolate, obtuse or acute at apex, acute or cuneate or rounded at base; upper surface smooth, shining, lower rusty-villous, often glaucescent; 7—15 cm. long, 3—7 cm. broad; midrib prominent, channelled above, raised beneath; main nerves 8—16 pairs, spreading, curved near the margin, the lowest close, impressed above, prominent beneath; transverse nervules many, slightly arched, subparallel, also impressed above; reticulation areolate; petiole rusty-tomentose, 4—10 cm. long. *Flowers* in short-peduncled (about 5 mm.) umbellules, in few- or many-flowered racemose axillary or lateral rusty-pubescent fascicles; umbellules up to 8 mm. broad in ♂, 6 mm. in ♀, with 4—5 orbicular concave involucre bracts; flowers in each umbellule 5—7, with short pedicels; perianth-tube short, villous within with long hairs; lobes 6, unequal, from linear-oblong to obovate, glabrous or nearly so, 2—3 mm. long. *Stamens* in ♂ normally 9, those of the 2 outer rows 3—3.5 mm. long with oblong anthers and slender filaments long villous especially at base; those of the 3rd row shorter and with a pair of large subsessile reniform glands near the bases of the filaments; rudimentary ovary 0. *Staminodes* of ♀ flowers 9 to 12, those of the 2 outer rows slender, clavate, 1—1.5 mm. long, those of the inner rows subulate or clavate 1 mm. long with a pair of large reniform glands as in ♂. *Ovary* ovoid; style thick, curved above; stigma large, peltate, lobed. *Fruit* ovoid, apiculate, 8 mm. long, 6 mm. broad, seated on the only slightly enlarged perianth-tube, which is 5 mm. in diam. at the mouth and bears the remains of the perianth-lobes and staminodes; fruiting pedicel obconic, greatly thickened, up to 5 mm. long, glabrous; pericarp smooth. Hook. f. Fl. Br. Ind. V. 163; Koord. & Val. Bijdr. X. 150; Brandis Ind. Trees 536. *Tetranthera amara*, Nees Syst. Laur. 551; Bl. Mus. Bot. Lugd.-Bat. I. 379; Miq. Fl. Ind. Bat. I. 1. 949; Meissn. in DC. Prodr. XV. 1. 190; Kurz. For. Fl. II. 299. *T. fruticosa*, Nees l.c. 543. *T. capitulata*, Miq. Pl. Jungh. I. 182 and Fl. Ind. Bat. l.c.

KEDAH: at Yan, Ridley 5491!; Rawi island 15697!. PENANG:

Wallich 7878!, 8005; *Phillips*!; *Curtis* 326!, 733!, 1073!. 1458!; *Ridley* 9340!. PERAK: at Tapa Simpang and Tupai, *Wray* 1260!, 2038!, 2047!, 2330!, 3603!; at Tapa Temango, etc., *Ridley* 14046!, 14505!, 14508!, 14583!; *Scortechini*!; Tea Gardens, *Ridley* 2981!; near Larut, *King's Collector* 998!, 2040!, 2584!, 3033!, 3431!, 3505!, 4494!, 5927!, 7626!, 7859!. SELANGOR: at Ulu Selangor and Bukit Kutu, *Goodenough* 10544!, 10545!; at Kepong, *Burn-Murdoch* (*Ridley*) 14285!; at Kwala Lumpur, *Ridley* 7626!. MALACCA: *Maingay* K. D. 1276!; *Griffith*!. SINGAPORE: *Ridley* 4825!. —DISTRIB. Burma, Malay Archipelago.

There is a huge amount of material available for the study of this polymorphic species. The old specimens of the Calcutta Herbarium were fortunately carefully arranged some years ago by Sir George King according to varieties. According to this arrangement, the most general form, that apparently described as such in the Fl. Br. Ind., is the var. *ochracea*, Blume, which is described above and that most easily separable is var. *fusco-tomentosa*, Meissn., which is maintained in the Fl. Br. Ind. and often has stamens with only 2 cells. Were it not for Sir George King's careful work, I should have preferred to follow Koorders and Valetton and treat the whole species as one with forms gradually passing from one to the other, but I think var. *fusco-tomentosa* above-mentioned and var. *angusta*, Meissn., also admitted in the Fl. Br. Ind., are clear enough. I have further added var. *attenuata*, the form with large leaves long acuminate at apex and attenuate at base; but of this I have more doubt, for the specimens graduate into the general form on the one hand and into *angusta* on the other.

Var. *fusco-tomentosa*, Meissn. l.c. *Leaves*, branchlets and innovations densely villous with long golden-tawny hairs; the leaves variable, usually ovate or ovate-oblong but sometimes even oblanceolate or obovate, usually cuspidate-acuminate at apex, rounded at base but occasionally acute, the length often up to 20 cm., the breadth to nearly 10 cm.; main nerves up to 20 pairs, the lowest pairs close together; branchlets often zigzag. *Flowers* as in type, but stamens often only 2-celled, apparently by loss of the partitions between the upper and lower cells. Hook. f. Fl. Br. Ind. V. 163.

PERAK: at Gunong Ijuk, *Scortechini*!; at Simpang and Tupai Larut, *Wray* 2047!, 2330!. NEGRI SEMBILAN: at Gunong Angai, *Ridley* 11895!. TRINGGANU: at Bundi, *Rostado*!. MALACCA: *Griffith* K. D. 4293!; *Maingay* K. D. 1251; at Sungli Hudang, *Goodenough* 1595!. JOHORE: near Gunong Panti and at Tebong Tinggyi, *Ridley* 4156! 11050!

The many specimens with only 2-celled anthers have puzzled me considerably, other characters being decidedly those of *Litsea* and not of *Lindera*.

I can only think that it is a case where the perhaps rather artificial distinction between the species having 4 and 2 cells respectively fails, as Sir D. Brandis has shown that it also fails in *Lindera*.

Var. *angusta*, Meissn. l.c.; Hook. f. in Fl. Br. Ind. l.c. *Leaves* glabrescent, often grey or silvery beneath, lanceolate or oblanceolate, acuminate at apex, attenuate at base. Flower-clusters axillary or lateral, ♂ with many or ♀ with few umbellules; rudimentary ovary in ♂ sometimes present, lanceolate, with long style and small capitate stigma. *Tetranthera angusta*, Wall. Cat. 6344; Nees in Wall. Pl. As. Rar. III. 30 and Syst. Laur. 641.

KEDAH: Langkawiisland, *Curtis* 2610!; *Ridley* 14965!. PENANG: *Wallich* 6344!. PERAK: Upper Perak, *Wray* 3559!; Gunong Bubu, *King's Collector* 6772!, 7620!. MALACCA: *Griffith* K. D. 4295!; Sungei Udang, *Derry* 524!; Gunong Sedang, *Ridley*!; Bukit Tampu, *Goodenough* 1957!. PAHANG: Pekan, *Ridley* 2266!—DISTRIB. Burma.

Var. *attenuata*, King in Herb. Calc. *Leaves* oblong-lanceolate or -oblanceolate, acuminate at apex, narrowed or rounded at base, often nearly 20 cm. long, minutely rusty-pubescent beneath. Flower clusters with few or many umbellules, these with rather long peduncles.

PENANG: Penang Hill, Batu Feringy, etc., *Ridley* 9473!, etc.. PERAK: Larut, Ulu Selangor and Ulu Bubong, *King's Collector* 4614!, 8750!, 10142!. SELANGOR: at Weld's Hill, *Burn-Murdoch* 4!. MALACCA: *Maingay* K. D. 1266!, 1278!; at Batu Tiga, *Derry* 990!. PAHANG: at Kwala Luit, *Ridley* 2265!, at Telun, *Ridley* 13781!.

10. *LITSEA HIRSUTISSIMA*, Gamble in Kew Bull. 357 (1910). A shrub reaching 2.5 m. in height; branchlets rather stout, nearly black, the younger ones clothed with long golden hairs as are the innovations, the margins and nerves of the leaves and the inflorescence. *Leaves* soft, membranous, alternate; elliptic or elliptic-ovate, acuminate and often with a long (10—15 mm.) filiform acumen at apex, more or less rounded at base; upper surface dark green when fresh, chestnut-brown and shining when dry, the younger with prominent scattered golden stiff hairs the older glabrescent, under surface paler similarly hirsute especially on the nerves; 15—20 cm. long, 7—12 cm. broad; midrib rather slender, channelled above; main nerves 12—15 pairs, impressed above, regular and regularly curved to the margin; transverse nervules many, subparallel, conspicuous; reticu-

lation obscure; petiole stout, 1—2 cm. long, densely golden-hirsute, often geniculate at the leaf-insertion. *Flowers* in umbellules on slender, 1 cm. long, peduncles, clustered in the axils of the leaves, rarely more than 3—4 together; involucre bracts 4, concave, nerved, the margins fimbriate, hirsute without, glabrous within; flowers in each umbellule 5—6; perianth-lobes oblong, 2—3 mm. long, very glandular, nearly glabrous, the apex dentate; pedicels very short. *Stamens* of ♂ flowers 9; filaments slender, glabrous except a tuft of long hairs at their bases; anthers 4-celled, those of outer rows obovate, those of the inner row ovate with a pair of large sessile glands a little above the base of the filaments, rudimentary ovary 0. *Staminodes* of ♀ flowers and *fruit* not known.

PERAK: road to Gunong Hijan, 750 m. alt., *Curtis* 1344!; Goping and Thaiping 90—150 m. alt., *King's Collector* 404! 8399!

Var. *geniculata*, Gamble. *Branchlets* prominently geniculate at the nodes. *Leaves* smaller (8—12 cm. long, 6—7 cm. broad), ovate or orbicular, obtuse and sometimes slightly apiculate at apex, subcordate at base, bullate; upper surface shining, glabrous. *Flowers* similar but anthers sometimes 2-celled or with very minute upper cells, filaments sparsely hirsute.

PERAK: at Goping, *King's Collector* 878!

This variety comes very near indeed to extreme forms of *L. amara*, var. *fusco-tomentosa*, and may be said to be a connecting link between the two species.

11. *LITSEA POLYANTHA*, Juss. in Ann. Mus. VI. 211 (1805). A moderate-sized evergreen tree, reaching 12—18 m. in height and 50—60 cm. in diam. of stem; bark dark grey; branchlets moderately stout, somewhat angular, dark brown, the uppermost and innovations with more or less tawny pubescence; buds lanceolate, leafy. *Leaves* soft when fresh, chartaceous when dry, alternate, sub-bifarious; elliptic or elliptic-oblong or suborbicular, obtuse or slightly acute at apex, rounded at base or nearly subacute; glabrous and dull on the upper surface, grey- or tawny-pubescent on the lower sometimes nearly glabrous; 7—15 cm. long, 4—10 cm. broad; midrib rather slender, impressed on the upper, raised on the lower surface; main nerves 8—12 pairs, at about 60° with the midrib at first then curving to the margin, impressed above; transverse nervules many, parallel and prominent beneath, joined again by subparallel reticulations; petiole pubescent, 12—25 mm. long. *Flowers* in pedunculate (6—12 mm. long)

umbellules, many together in short axillary or lateral tawny-pubescent bracteate racemes 5—6 mm. long, several such racemes together often forming dense cylindric clusters of flowers around the branchlets; umbellules when open 10—12 mm. broad in ♂, 8 mm. in ♀; involucre bracts 4—5, orbicular, concave, reflexed in flower; flowers in each umbellule 5—6; perianth-tube short, on a 2—3 mm. long villous pedicel; lobes usually 6, very variable in shape, from linear-oblong to elliptic or obovate, ciliate, glandular-punctate, 2—3 mm. long. *Stamens* in ♂ flowers normally 9, an outer row of 3 eglandular, a second row of 3 1—2-glandular, a 3rd row of 3 opposite the first biglandular, but sometimes there is a 4th row of 3 biglandular and occasionally a few more, the outer rows slightly longer than the inner, up to 4 mm. in all; glands large, reniform, stipitate, attached to the slender villous filaments near the base; upper anther-cells all introrse, lower lateral or extrorse; rudimentary ovary 0. *Staminodes* in ♀ flowers in similar number and arrangement, the outer rows clavate with slender villous filaments 2 mm. long, the inner subulate thick 1.5 mm. long, the glands very large. *Ovary* ovoid; style thick, slightly curved; stigma broad, peltate. *Fruit* ellipsoid, 7—10 mm. long, seated on the slightly enlarged perianth-tube 4 mm. broad, with somewhat reflexed entire margins; enlarged pedicel 7 mm. long hardly thickened; pericarp smooth, black; cotyledons hemispherical. Hook. f. Fl. Br. Ind. V. 162; Prain Beng. Plants 903; Brandis Ind. Trees 536; Koord. & Val. Bijdr. X. 147. *L. monopetala*, Pers. Syn. II. 4. *Tetranthera monopetala*, Roxb. Cor. Pl. II. 26, t. 148 and Fl. Ind. III. 821; Nees in Wall. Pl. As. Rar. II. 66 and Syst. Laur. 525; Blume Mus. Bot. Lugd.-Bat. I. 378; Meissn. in DC. Prodr. XV. 1. 189; Miq. Fl. Ind. Bat. I. 948; Brandis For. Fl. 380, t. 45; Kurz For. Fl. II. 299. *T. macrophylla*, Wall. Cat. 2549. *T. alnoides*, Miq. Pl. Jungh. 180 and Fl. Ind. Bat. l.c. *T. hexantha*, Sieb. Fl. Maurit. 92.

PENANG: *Maingay* K.D. 1277!; Government Hill, *Curtis* 283!; Government Hill and Balik Pulau, *Ridley* 6371!, 7065!, 9731!, 10352!. PERAK: Gunong Pundo, *King's Collector* 8326! PAHANG: at Pulau Tawar, *Ridley* 2271!; at Sungei Telai, *Machado* 11553!; at Kwala Tembeling, *Ridley's Collector*! (these two with more glabrous involucre).—DISTRIB. Northern India, Burma, Java, China.

12. *LITSEA CORDATA*, Hook. f. in Fl. Br. Ind. V. 177 (1886). A spreading evergreen tree reaching 15 m. in height, occasionally 30 m. with a diameter of 90 cm. (Kunstler 8269); branchlets rather

slender, smooth, black when dry, the uppermost rusty-tomentose as are the innovations. *Leaves* membrano-chartaceous, alternate; broadly ovate or ovate-oblong, acute or acuminate at apex, cordate at base sometimes unequally; upper surface smooth, shining, glabrous except on the nerves, lower rusty-tomentose, dark reddish-brown when dry; 10—17 cm. long, 6—10 cm. broad; midrib slender above and channelled, stouter below; main nerves 10—14 pairs, impressed above, raised beneath, the lowest 1—2 pairs curved downwards and then up, the rest at 50°—70° with the midrib at first straight then curved to near the margin where they fade away in diminishing loops; transverse nervules prominent, straight or slightly curved, sometimes branched, enclosing the minutely areolate reticulation; petiole rather slender, 10—25 mm. long, often rugose. *Flowers* in umbellules on slender peduncles 7—10 mm. long in ♂, 4—5 mm. in ♀, in slender puberulous axillary erect or drooping racemes reaching to 16 cm. long in ♂, barely 10 cm. in ♀; rhachis angled; raceme bracts small, ovate, tomentose, 1—2 mm. long, caducous; umbellules 7—8 mm. in diam. when open; involucrel bracts 5, slightly puberulous without, glabrous within, the outer 3 orbicular concave, the inner 2 obovate and much smaller; flowers in each umbellule 6, on very short golden-villous pedicels; perianth tube short, long-pilose within, lobes 6, oblong, obtuse or acute, glabrous except for a few long pilose hairs on the back, ♂ 3 and ♀ 2 mm. long, gland-dotted, those of ♀ early deciduous. *Stamens* of ♂ flowers 12, those of the outer rows 3 mm. long with ovate anthers and slender filaments bearing long pilose hairs in tufts near the base, those of the inner rows similar but shorter with a pair of large oblong sessile glands a little above the bases of the filaments; rudimentary ovary ovoid, thickly pilose with twisted style and capitate stigma. *Staminodes* of ♀ flowers also normally 12, sometimes fewer in inner rows, those of the outer rows clavate about 1 mm. long, the filaments bearing a tuft of pilose golden hairs as in ♂, those of the inner rows subulate, scarcely shorter, with a pair of large oblong subsessile glands a little above the base. *Ovary* ovoid, apparently glabrous; style thick, curved; stigma peltate, lobed. *Fruit* oblong, acute, glossy dark red when fresh, black when dry, up to 2 cm. long, 9 mm. broad, seated on the slightly enlarged perianth-tube, which at first is somewhat cup-shaped enclosing the base of the fruit, afterwards slightly obconic, spreading and flattened, about 5 mm. in diam., the margins smooth; enlarged pedicel about 1 cm. long; pericarp smooth, thin; cotyledons semi-

oblong. *Tetranthera cordata*, Jack in M'Clelland's Calc. Journ. Nat. Hist. IV. 356; Walp. Ann. Bot. Syst. I. 578; Meissn. in DC. Prodr. XV. 1. 196. *T. cordifolia*, Meissn. l.c.

PERAK: at Assam Kumbong, Sungie Larut, Thaipeng, etc., Wray 2126!, 2462!, 2871!, 3045!; *Scortechini*!; road to Campar, Ridley 9597!; dense jungle on low ground and hills up to 180 m. alt. near Larut, *King's Collector* 3176!, 3962!, 5180!, 6529!, 8269!, 10824!. SELANGOR: at Kerling, *Goodenough* 10537!. MALACCA: *Griffith* 4298!; at Sungei Udang, *Goodenough* 1353!. JOHORE: at Kota Tinggi, *Ridley* 4226!; at Bukit Murdon, *Lake and Kelsall* 4027!. SINGAPORE: at Kranji, *Ridley's Collector* 6743!; at Bukit Timah, *Kunstler* 353!—DISTRIB: Sumatra; Borneo (near Kuching, Sarawak, *Haviland* and *Hose* 1807!; at Rejang, Sibul, *Haviland* and *Hose* 3654 C!);

The flowers of the Borneo specimens are slightly larger than those from the Peninsula, but the specimens are better developed and the structure is the same.

13. *LITSEA CITRATA*, Blume Bijdr. 565 (1825). A deciduous (?) shrub or small tree reaching 10—12 m. in height with 15—20 cm. diameter of stem, all parts orange-scented; branchlets slender, smooth, nearly black when dry, leaf-buds naked, acuminate, tawny-puberulous. *Leaves* membranous; lanceolate, attenuately acuminate at apex, attenuate or cuneate or sometimes rounded at base; upper surface smooth, shining, glabrous, olivaceous or blackish, lower glaucous; 7—13 cm. long, 2—4.5 cm. broad; midrib slender, dark and prominent on the lower surface; main nerves 10—12 pairs at first at nearly 80° with the midrib then curving to and along the margin, secondary nerves rather prominent, transverse nervules and reticulation prominent on the upper surface when dry; petiole slender, 10—18 mm. long, glabrous. *Flowers* in axillary or lateral umbelliform racemes bearing on peduncles about 5 mm. long about 7 involucre umbellules; involucre of 4 concave nearly glabrous bracts; flowers in each umbellule 5 on slender puberulous pedicels; perianth-tube short, lobes 6, oblong or obovate, ciliate, silky within, 2 mm. long, those of ♂ and ♀ flowers similar. *Stamens* of ♂ flowers 9 (occasionally up to 12), those of the first two rows eglandular with quadrate anthers and slender filaments sparsely villous as is the connective, 3 mm. long; those of the third row rather shorter, also with quadrate anthers and a pair of large sessile or subsessile reniform glands attached near the bases of the filaments; anther-

cells all introrse except the lower ones of inner row which are often lateral; rudimentary ovary conical, with slender style and small spreading stigma. *Staminodes* of ♀ flowers 9, those of the 1st and 2nd rows linear, villous, 1 mm. long, those of the 3rd row subulate, villous, with a pair of large semisagittate sessile glands above the base of the filaments. *Ovary* ovoid, glabrous, with short thick style and large peltate usually lobed stigma. *Fruit* small, globose, 5—6 mm. in diameter, seated on the very slightly enlarged flattened perianth-tube about 2 mm. broad; pedicel 5 mm. long; pericarp fleshy, glabrous, aromatic; cotyledons hemispherical. Hook. f. Fl. Br. Ind. V. 155; Koord. & Val. Bijdr. X. 142; Brandis Ind. Trees 535. *Tetranthera citrata*, Nees Syst. Laur. 560; Bl. Mus. Bot. Lugd.-Bat. I. 385; Miq. Fl. Ind. Bat. I. 958. *T. polyantha*, Wall. Cat. 2538; Nees in Wall. Pl. As. Rar. II. 67 and Syst. Laur. 545. Meissn. in DC. Prodr. XV. 1. 182 (excluding China as locality); Kurz For. Fl. II. 301.

PERAK: Thaiping Hills, 3000 ft., *Ridley* 11390! PAHANG: at Telom, *Ridley* 13780!.—DISTRIB. India (Eastern Himalaya, Assam, Khasia Hills, Manipur, usually above 5000 ft.), Upper Burma, Java (above 2000 ft.).

It is very difficult in poor specimens to distinguish this from *Lindera pipericarpa*.

14. *LITSEA PETIOLATA*, Hook. f. in Fl. Br. Ind. V. 171 (1886). A very large evergreen tree reaching to 30 or even 45 m. in height and to more than 1 m. in diameter of stem; branchlets moderately stout, grey-brown when dry, uppermost and innovations glabrous except the minutely puberulous grey ovate-lanceolate buds. *Leaves* chartaceous, alternate; elliptic or elliptic-oblong or -lanceolate, obtuse or obtusely acute or sometimes acuminate at apex, cuneate sometimes unequally at base; upper surface bright green with yellow ribs when fresh, dull or shining reddish-brown when dry, glabrous, lower also glabrous, paler reddish-brown; 7—15 cm. long, 3—8 cm. broad; midrib impressed above; main nerves 5—8 pairs, slender, impressed above, curving to the margin; transverse nervules many, sub-parallel, not prominent; reticulation areolate; petiole slender, 1.5—2 cm. long. *Flowers* in umbellules on slender peduncles 5 to 10 mm. long in ♂, shorter and stouter in ♀, in rather dense lateral puberulous bracteate racemes usually 5—7 mm. long, forming clusters of up to 12; umbellules about 8 mm. in diam. in ♂, 5 mm.

in ♀ ; involucre bracts 5, glabrous or only minutely pubescent, thin, orbicular, concave, reflexed ; flowers in each umbellule 5—7, pedicels stout, pubescent ; perianth-tube short, lobes 6, linear-oblong, membranous, ciliate and laxly villous, 3 mm. long. *Stamens* in ♂ flowers 9, those of the outer 2 rows 5—7 mm. long with oblong anthers and filiform villous filaments, those of the inner row rather shorter with smaller anthers and a pair of small reniform stipitate glands at the base ; rudimentary ovary very small with long villous style and capitate stigma. *Staminodes* in ♀ flowers normally 9, those of the 2 outer rows subulate clavate 2—2.5 mm. long with hispid filaments, those of the 3rd row short clavate glabrous with a pair of large reniform shortly stipitate glands. *Ovary* globose, glabrous ; style thick, 3 mm. long ; stigma large, discoid. *Fruit* nearly globose, 6—7 mm. in diameter, seated on the very slightly enlarged flattened perianth-tube, about 3 mm. in diam., the margins sinuate somewhat reflexed ; pedicel stout, clavate, 5—7 mm. long ; pericarp smooth, rugose when dry.

PERAK : in open jungle on low hills up to 250 m. alt., *King's Collector* 430 !, 4460 !, 7759 !, 7761 ! ; *Scortechini* !. SELANGOR : at Kwala Lumpur, *Ridley's Collector* 4699 !. MALACCA : *Maingay* K.D. 1265 ! SINGAPORE : in Garden, Garden jungle, etc., *Ridley* 56 !, 3368 !, 6821 !, 10640 !, 10838 !, 11337 !, 11839 ! ; at Galang, *Baker* 3033 !. Vern. 'Poko Parawas'.

15. *LITSEA BRACHYSTACHYA*, Boerl. Handl. Fl. Ned. Ind. III. 143 (1900). A spreading evergreen tree reaching a height of 15—18 m. and up to 90 cm. in diam. of stem ; branchlets rather slender, smooth, nearly black when dry, angled, channelled decurrently from below the bases of the nodes, uppermost and innovations minutely grey-puberulous. *Leaves* chartaceous or subcoriaceous, alternate, glabrous ; elliptic or elliptic-ovate, obtusely acuminate at apex, acute or rounded often unequally at base ; upper surface shining, bright green when fresh, dark brown when dry, lower bluish green when fresh, brown when dry ; margins slightly recurved ; 10—14 cm. long, 5—7 cm. broad ; midrib slender, impressed above, prominently raised beneath ; main nerves 7—9 pairs, rather irregular, impressed above, at from 50° to 60° or sometimes 70° with the midrib, curved to join the margin ; transverse nervules rather distant and not prominent, straight or curved, enclosing the netted and rather obscure reticulation ; petiole slender, 15—25 mm. long, channelled above. *Flowers* in umbellules or slender peduncles up to 6 or even 10 mm.

long in panicles of racemes reaching to 4 sometimes to 10 cm. in length; rhachis angled, black when dry, minutely puberulous or glabrescent; raceme bracts minute, grey-puberulous, caducous; umbellules when open 5 mm. in diam.; involucre bracts 4—5, glabrous, reflexed in flower, the outer orbicular, the inner ovate or oblong; flowers in each umbellule 5—6, very small, on short villous pedicels; perianth-tube glabrous within except for tufts of long hair at the mouth; lobes 6 or fewer, some occasionally wanting, some merely linear, normally lanceolate, acuminate, villous on the back, 1—1.5 mm. long, those in ♀ flowers early deciduous in a ring. *Stamens* of ♂ flowers usually 9, the 6 of the outer rows 2 mm. long with subquadrate anthers and slender filaments long pilose at the base, the 3 of the inner row shorter and with a pair of shortly stipitate reniform glands near the bases of the filaments; rudimentary ovary 0. *Staminodes* of ♀ flowers 9, those of the outer rows 6 clavate, the filaments long-pilose, those of the inner row 3 subulate with a pair of large nearly sessile glands at their middle. *Ovary* globose, glabrous; style short; stigma large, peltate, lobed. *Fruit* globose or slightly ellipsoid, 8 mm. long, 7 mm. in diam., seated on the slightly enlarged obconic perianth-tube 3 mm. in diam.; enlarged pedicel 5 mm. long; pericarp thin, smooth; cotyledons hemispheric. Koord. & Val. Bijdr. X. 156. *Tetranthera brachystachya*, Bl. Mus. Bot. Lugd.-Bat. i. 384 (1851); Meissn. l. c. 196. *T. lucida*, Hassk. Cat. Hort. Bogor. 90 (1844) and Pl. Jav. Rar. 216; Miq. Fl. Ind. Bat. I. 1, 956 excl. syn.; Meissn. in DC. Prodr. XV. 1, 197.

PERAK: at Matang Jambu, etc., Wray 2518! 2886!; forests of Larut and Ulu Buvong at 120—200 m. alt., King's Collector 6855, 10528!—DISTRIB. Java.

The description of the fruit is taken from Buitenzorg specimens. Koord. and Val. consider that Wight's t. 1836 is probably intended to represent this species, but a comparison of the specimen of Wight's in Herb. Kew does not bear out this suggestion. Wight's t. 1836 probably represents *L. glabrata*, Wall. *Litsea lucida*, Bl. Bijdr. 961, is a *Lindera*.

16. *LITSEA ANGULATA*, Blume Bijdr. 563 (1825). An evergreen tree reaching 12—17 m. in height and 40—50 cm. in diam. of stem; branchlets moderately stout, grey, blackish-scurfy and lenticellate, uppermost angular, nearly black when dry, minutely puberulous; leaf buds lanceolate, grey-puberulous. *Leaves* coriaceous, alternate; elliptic or elliptic-oblong or -obovate, obtusely acute or acuminate at apex, attenuate or cuneate at base; upper surface olive-brown, shining,

glabrous; lower dark reddish brown, minutely but sparsely puberulous when young, afterwards glabrous; 10—20 cm. long, 4—6 cm. broad; midrib thick, impressed and sometimes keeled above, raised beneath; main nerves prominent, 7—12 pairs, usually 10, regular, parallel, impressed above, bisulcate beneath, leaving the midrib at from 65°—70° and curving rather obliquely to the margin where they end; transverse nervules obscure, very slender, numerous and nearly straight, sometimes branched, enclosing the very minute obscure reticulation; petiole stout, 10—25 mm. long, black. *Flowers* in umbellules on slender grey-pubescent peduncles 5—7 mm. long, in axillary or lateral short pubescent racemes reaching (buds only) 1 cm. in length with about 6 flowers; involucre bracts 5, the 2 outer coriaceous, glabrous, orbicular, concave, the rest membranous and ovate, the innermost fimbriate and puberulous without; flowers in each umbellule 6, subsessile; perianth lobes 6—8, irregular in shape, sometimes alternately ovate-acute and oblong-obtuse, densely golden-villous without. *Stamens* in ♂ flowers (from bud only) 12—16, usually 12, glabrous, those of inner rows with a pair of large angular glands near the bases of the filaments. *Staminodes* of ♀ flowers 9, the 3 inner short and furnished with large quite adnate glands (Koorders & Valetton). *Fruit* glossy, dark red, ovate-oblong, 2 cm. long, 1 cm. in diam., the tip obtusely acute, seated on the flattened enlarged perianth-tube with undulate margins 6 mm. in diam.; enlarged pedicel clavate, flattened, 14—17 mm. long; pericarp when fresh speckled with white, the tip green (Kunstler) when dry nearly black. Koord. & Val. Bijdr. X. 158. *L. Reinwardtii*, Bl. M.S. fide Meissn. *Tetranthera angulata*, Nees Syst. Laur. 544; Blume Mus. Bot. Lugd.-Bat. I. 384; Miq. Fl. Ind. Bat. I. 1. 956; Meissn. in DC. Prodr. XV. 1. 197. *T. pseudo-angulata*, Bl. p. c. I. 385.

PERAK: on low ground at Larut, *King's Collector* 5350!, 6683!.
 SELANGOR: at Gua Batu, *Ridley* 8505!—DISTRIB. Java.

I believe the identification to be correct: unfortunately there are only leaf specimens available for comparison in the Kew and Calcutta Herbaria. Koorders and Valetton describes the drupes as depressed-globose.

17. *LITSEA SPATHACEA*, Gamble in Kew Bull. 358 (1910). A shrub or small shrubby tree scarcely reaching 6 m. in height and 5—8 cm. diam. of stem; branchlets rather stout, pale brown, sulcate or striate, fenticellate, innovations puberulous; buds lanceolate, leafy. *Leaves* submembranous, alternate, very variable; elliptic-oblong or

-oblanceolate or -obovate, rounded or acute or acuminate sometimes even cuspidate at apex, cuneate or attenuate at base; upper surface dull, olive-green, glabrous, lower glaucous or bluish-green, rarely reddish, also glabrous; 8—24 cm. long, 5—10 cm. broad; midrib pale, slender, impressed above, prominent beneath; main nerves 9 to 12, pale, curving upwards to join in loops near the margin; transverse nervules few but nearly straight and prominent, shining, conspicuous on the under surface, the smaller reticulations very evident on the upper surface when dry; petiole 5—20 mm. long, bordered above by the decurrent margins of the blade. *Flowers* in sessile or very shortly peduncled umbellules in very short few-(1—3-) flowered long-bracteate racemes axillary or lateral; bracts subulate, 3—5 mm. long; umbellules with 6 ovate-orbicular concave involucre bracts, the inner 3 smaller than the 3 outer, densely tomentose without, glabrous within, 5—7 mm. long, ♂ and ♀ nearly equal in size; flowers in each umbellule usually 6; perianth-tube short (1—1.5 mm.) in ♂, longer (3 mm.) in ♀; lobes 6, ovate, acute in ♂, oblong in ♀, ciliate, 1-nerved, 3 mm. long, glabrous or nearly so within. *Stamens* in ♂ flowers 9—12 in 4 rows, most (usually 6) of outer rows eglandular with 6 of inner rows shorter and biglandular, but often 3 only in inner row biglandular; outer rows 4 mm. long with small ovate acute anthers and very slender glabrous filaments, inner 2.5 mm. long with smaller anthers and shorter filaments and a pair of large sessile or shortly stipitate glands at their bases; rudimentary ovary ovate, very small with thick often bent style and peltate stigma. *Staminodes* of ♀ flowers as the stamens of the ♂ the outer ones clavate on capillary stalks 3 mm. long, the inner similar but 1—5 mm. long and with a pair of oblong glands at the base. *Ovary* ovoid with thick fleshy geniculate style and peltate slightly lobed stigma. *Fruit* ovoid, apiculate, 12—15 mm. long, 8—10 mm. broad, seated on the enlarged persistent but thin chartaceous perianth-tube which is 12 mm. in diam. bearing the persistent perianth lobes and often cleft in 2—5 segments; pericarp thin, glabrous; cotyledons semi-ovoid, fleshy.

PERAK: at Relan Tujor, Sungie Larut and Maxwell's hill, *Wray* 2198!, 2286!, 2755!; at Maxwell's hill, *Scortechini* 1410!; among rocks, in dense forest and up to 1000 m. alt., *King's Collector* 3493!, 4971!, 5130!, 5280!; Maxwell's hill, *Ridley*! SELANGOR: at Kwala Lumpur, *Curtis* 2371!

Var. *tomentosa*, Gamble. *Leaves* more obovate, rusty-pubescent beneath as are the upper branchlets and buds.

PERAK: *Scortechini* 1289!

18. *LITSEA MAGNIFICA*, Gamble. A small tree, bark smooth, pale, thin; branchlets moderately stout, pale brown, uppermost angular rusty-pubescent; buds lanceolate, hardly perulate. *Leaves* pergamaceous, more or less crowded towards the ends of the branchlets; oblanceolate, rounded and very shortly acuminate at apex, very long and narrowly-cuneate at base; upper surface dull, olive-green when dry, glabrous except the midrib; lower surface paler, minutely grey-puberulous or glabrous except on the nerves; 23—43 cm. long, 6—10 cm. broad; midrib stout, flat or impressed above, very prominent beneath; main nerves 15 to 20 at about 50° with the midrib, slightly curved to the margin, impressed above, raised beneath; secondary nerves few and short; transverse nervules irregular and obscure; reticulation obscurely netted; petiole stout, 1 cm. long, sometimes 0. *Flowers* in long- (about 2 cm.) peduncled umbellules in very short thick woody racemes each bearing about 12 and about 7 mm. long, the racemes forming globose clusters 7—8 cm. broad on thick branches below the leaves; umbellules with 6 orbicular concave involucre bracts, densely grey-pubescent without, glabrous within, ♂ umbellules about 2 cm. in diam. when open, ♀ much smaller; flowers in each umbellule 7—9 in ♂, about 5 in ♀; perianth-tube funnel-shaped, 2—3 mm. long; perianth-lobes usually 6, oblong, ciliate, glandular, 3-nerved, 5—6 mm. long in ♂, 4 in ♀. *Stamens* of ♂ flowers 9 to 12, usually 12 in 4 rows, those of the two outer rows 7—9 mm. long, the filaments very slender and villous, the anthers 3.5—4 mm. long, acuminate, the upper cells oblong introrse, the lower overlapping the upper and lateral; those of the two inner rows 5—6 mm. long, similar but with the anthers shorter, and bearing at the base of the filaments a pair of stout pyriform sessile or subsessile glands under 1 mm. long; rudimentary ovary ovoid with long (4—5 mm.) style and spreading 2—3-fid stigma. *Staminodes* of ♀ flowers usually 12, sometimes more and rather variable, those of the 2 outer rows linear-subulate, 4—5 mm. long, slightly villous near the base, those of the 2 inner rows shorter and rather stouter 3—4 mm. long and bearing a pair of stout basal glands as in the ♂. *Ovary* ovoid; style 7 mm. long, gradually expanding upwards; stigma peltate, lobed, 2.5 mm. in diam. at top. *Fruit* (unripe) ovoid, subtruncate, apiculate, 10 mm. long, 7 mm. broad, seated on

the cup-shaped enlarged perianth-tube, smooth on the margins or with the remains of the perianth-lobes and staminodes, pubescent without, 5 mm. high and 8 mm. in diam.; pericarp thin, smooth, dotted. *Lepidadenia magnifica*, Miq. Fl. Ind. Bat. I. 936. *Cylindrophne magnifica*, Meissn. in DC. Prodr. XV. 1. 203.

PENANG: Waterfall gardens, *Ridley* 10770!. MALACCA: at Nyalas, *Derry* 1017!. (Vern. 'Madang Telon'); *Ridley's Collector* 448! (Vern. 'Madang Kuraing').—DISTRIB. Sumatra (*Teysmann* 1011 from Batang baroes, west coast!).

Teysmann's specimen in Herb. Calc. has leaves only but all the specimens enumerated agree with it.

Var. *pahangensis*, Gamble. Leaves larger, up to 12 cm. broad, more coriaceous, shining above reddish beneath when dry; main nerves less oblique, at about 70° with the midrib, deeply impressed, up to 25; petiole up to 2 cm. long, very stout.

PAHANG: at Pulau Chenkel and Kwala Tenok, *Ridley* 2271! etc., (Vern. 'Thadang Kunyit').

The ♂ flowers of this variety exactly agree with those of *Derry* 1017. The ♀ flowers have been used in the description of the species.

19. *LITSEA RIDLEYI*, Gamble in Kew Bull. 317 (1910). A tree; branchlets moderately stout, dark brown, uppermost minutely rusty-puberulous as are the lanceolate buds and the inflorescence. Leaves chartaceous, alternate; elliptic-oblong or lanceolate, obtuse or acute or acuminate, often mucronate at apex, long attenuate at base; upper surface smooth, shining, glabrous except the rusty-puberulous midrib, minutely areolate-reticulate; lower paler or even sub-glaucous, younger slightly puberulous, later glabrescent, the nerves pubescent; margins recurved; 10—25 cm. long, 4—8 cm. broad; midrib slender, scarcely raised above, prominent beneath; main nerves 7—10 pairs, often irregular or branched, impressed above, raised beneath, starting at about 50° with the midrib and curving upwards to and along the margin, the uppermost 2—3 pairs nearly rejoining the midrib at its apex; transverse nervules very irregular, prominent, enclosing a faint areolate reticulation; petiole stout, flattened above, slightly rugose, nearly black, 1.5—2.5 cm. long. Flowers in short (up to 12 mm.) slender-peduncled umbellules in very short axillary or lateral racemes of 6—12, the racemes densely rusty-villous about 5 mm. long; umbellules 8—10 mm. broad when open; involucre bracts 4, ovate-oblong, concave, 4 mm. long; flowers in

each umbellule 4—6; perianth-tube short, lobes 6, oblong, villous, 2—3 mm. long. *Stamens* in ♂ flowers usually 9 (sometimes but less often up to 12), those of the outer rows 3 mm. long with sub-quadrate anthers and slender villous filaments, those of the inner rows shorter and with a pair of subsessile glands attached a little above the bases of the filaments; rudimentary ovary conical, with slender style and bifid stigma. *Staminodes* of ♀ flowers usually 12 (sometimes 9), those of the outer rows clavate with villous filaments 1—2 mm. long, those of the inner rows shorter and with a pair of rather large glands a little above the base. *Ovary* ovoid, glabrous; style curved; stigma subcapitate, bifid. *Fruit* nearly globose, 15 mm. in diam., seated on the enlarged, at first nearly closed, later hemispheric, at length obconical rugose perianth-tube about 6 mm. high, 8—10 mm. in diam. at the crenulate mouth and bearing the remains of the lobes and staminodes; pedicel short, slightly enlarged only; pericarp smooth, somewhat shining and wrinkled when dry.

SINGAPORE: at Changi, *Ridley* 3803!; at Reservoir Road, *Ridley* 5101!; at Bukit Mandai, *Ridley* 3836!, 4701!, 5064!, 5852!, 10833!; at Holland Road, *Hullett*; at plant house, *Cantley* 193!

This species is not unlike *L. Wallichii*, Hook. f., but differs in being pubescent and having leaves not prominently areolate-reticulate.

20. *LITSEA PENANGIANA*, Hook. f. in Fl. Br. Ind. V. 171 (1886). A small evergreen tree, reaching 7—9 metres in height and 15 cm. diameter of stem; branchlets pale brown densely softly rusty-tomentose as are the innovations, petioles and inflorescence; buds ovoid. *Leaves* coriaceous, alternate; elliptic-oblong, obtuse or shortly acute at apex, cuneate at base; upper surface dark-green when fresh, olive-brown when dry, glabrous, somewhat shining; lower pale bluish-grey when fresh, cinnamomeous when dry, at first minutely soft tomentose especially on the nerves, afterwards glabrous; 10—22 cm. long, 4—7 cm. broad; midrib stout, slightly channelled above; main nerves 8—10 pairs curving upwards to and along the margin, transverse nervules and reticulation faint on lower, minutely areolate on upper surface; petiole stout, 1—2.5 cm. long. *Flowers* in sessile or very shortly (up to 5 mm.) peduncled umbellules in very short small racemose axillary or lateral clusters of 3—4; involucre bracts 4, densely tomentose, ovate, concave; flowers in each umbellule 4—6; pedicels very short or 0; perianth-tube stout, 2 mm. long, villous within; lobes 6, oblong, obtuse, ciliate, glabrous within, tawny-villous without, 2—3 mm. long, erect or

spreading in ♂, more spreading in ♀. *Stamens* of ♂ flowers 12, in 4 rows, those of the outer row longest, 3 mm. long, eglandular, those of the 2nd 2.5 mm. long eglandular, those of the 3rd and 4th 2—2.5 mm. long with a pair of large reniform stipitate glands near the base; anthers ovoid, filaments of outer rows villous, of inner nearly glabrous, cells of 4th row anthers sometimes 2 only, all introrse; rudimentary ovary slender with slender style and bifid stigma. *Staminodes* of ♀ flowers 12, those of 2 outer rows slenderly clavate, 2 mm. long with villous filaments, those of inner rows similar but shorter and with a pair of large stipitate glands near the base. *Ovary* ovoid; style thick, curved; stigma peltate, bifid. *Fruit* ellipsoid, apiculate, 8—12 mm. long, 7—8 mm. broad, seated on a thick cup formed by the enlarged perianth-tube, cup at first nearly enclosing the fruit, afterwards hemispheric 10 mm. in diameter, the outside rugose, the margin crenulate with remains of the perianth-lobes and staminodes; enlarged pedicel very short, thick; pericarp shining, yellowish when dry.

PENANG: *Phillips*; on Government Hill, *Maingay* K.D. 1258/2!; at Moniots' road, 600 m. alt., *Curtis* 1587!, 2159!; at 550 m., *King's Collector* 1580!. PERAK: at lower camp, Gunong Batu Pateh, *Wray* 921!, 969!, 1081!, 1188!; *Scortechini* 369!; at 300 to 600 m. alt., *King's Collector* 8067!

The leaves and fruit of this species resemble those of *L. Griffithii*, but the leaves are alternate and not opposite and the flowers are different. Were it not for the remarks made by Sir Jos. Hooker in the Fl. Br. Ind. I should have been disposed to refer this species to *Tetranthera accedens*, Blume.

21. *LITSEA CASTANEA*, Hook. f. in Fl. Br. Ind. V. 171 (1886). A large tree reaching 30 or 40 m. in height and a great girth of stem; branchlets rather stout, dark grey-brown, hoary, lenticellate, uppermost minutely greyish-tawny-puberulous as are the linear lanceolate buds the petioles and inflorescence. *Leaves* chartaceous, alternate; elliptic, elliptic-ovate or -obovate, sometimes nearly orbicular, obtuse or emarginate at apex, rounded sometimes unequally at base; upper surface dark green when fresh, shining and dark reddish-brown when dry, lower paler and redder, both glabrous except the nerves, sometimes puberulous beneath and areolate reticulate; margins recurved; 7—22 cm. long, 5—10 cm. broad; midrib stout, deeply impressed above, much raised beneath; main nerves 8—16 pairs, deeply impressed above, at an angle of about 60° with the midrib at first nearly straight then curved to near the

margin where they, at any rate the upper ones, meet in loops strongly marked beneath; transverse nervules many, prominent, slightly arched; reticulation minutely netted; petiole fairly stout, 1—2.5 cm. long, channelled above. *Flowers* in umbellules on rather stout peduncles 8—12 cm. long in short axillary or lateral 6—8 mm. long racemes of about 6—8 each; raceme bracts ovate deciduous; umbellules when open 10—12 mm. broad (σ only); involucral bracts 4.5, ovate or ovate orbicular, concave, white-tomentose, reflexed in flower; flowers in each umbellule 4—6; perianth-tube 3 mm. long, lobes 6—8, spreading or reflexed, variable but usually oblong-spathulate, densely villous without, glabrous within, 5 mm. long. *Stamens* in σ flowers 12—16, normally 12, those of outer rows 6—8 mm. long with ovate anthers and very slender sparsely villous filaments, those of inner rows shorter with subquadrate anthers and a pair of round long stipitate glands at about one-third of the length of the filaments; rudimentary ovary 0. *Staminodes* in ϕ flowers (bud only) 9—15, those of the outer rows clavate with villous filaments, those of the inner rows subulate-clavate with a pair of reniform stipitate glands near the base. *Ovary* globose, included in the speedily circumsciss perianth-tube; style thick, curved, glabrous; stigma large, conical. *Fruit* ovoid, to cylindric-ovoid 12 to 20 mm. long, 8 to 10 mm. broad, the base enclosed in the hemispheric cup-shaped enlarged perianth-tube 7—8 mm. high and 12 mm. in diam. at the circular mouth, the outside slightly rough, slightly puberulous; pedicel rather slender, slightly flattened, 10 mm. long; pericarp smooth, shining, yellowish-brown when dry.

PERAK : at Sungie Larut and Kota, *Wray* 2353!, 2867!, 3119!; in mixed forest about Larut up to 450 m. alt., *King's Collector* 3296!, 3509!, 4937!, 6497!, 10283!, 10926! SELANGOR : at Kwala Lumpur, *Ridley's Collector*!; *Burn-Murdoch* (*Ridley* 13204!) MALACCA : *Maingay* K.D. 1239!; at Bukit Bruang, *Goodenough* 1422!; at Brisu, *Derry* 1047!.

22. *LITSEA QUERCINA*, Gamble in Kew Bull. 318 (1910). A tree; branchlets greyish-brown, rather slender, uppermost grey-pubescent as are the innovations and the petioles and midrib of the leaves. *Leaves* coriaceous, alternate, areolate-reticulate; elliptic or elliptic-ovate, obtuse and mucronate sometimes emarginate at apex, rounded at base; both surfaces dark greyish-brown when dry, upper shining, glabrous except on the nerves, lower minutely puberulous

to nearly glabrous; 6—8 cm. long, 3—3.5 cm. broad; midrib slender but prominent, pubescent, deeply impressed above; main nerves 7—9 pairs, impressed above, starting at about 70° with the midrib and curved to near the margin; transverse nervules faint; areolate reticulation prominent on both surfaces under the lens; petiole 8—10 mm. long, rather slender. *Flowers* in umbellules on peduncles 6—8 mm. long on very short lateral racemes. *Fruit* ellipsoid-oblong, 2 cm. long, 1 cm. in diam., seated on the cup-shaped enlarged perianth-tube, the cup black when dry, dull, 7 mm. high, 9 m. in diam. at the sharp circular margin; enlarged pedicel very stout, 4 mm. long; pericarp smooth, shining, yellowish and wrinkled when dry.

PERAK: at lower camp, Gunong Batu Pateh, Wray 1174!

Very near *L. castanea*, but has much smaller thicker leaves, not red when dry, and with fewer main nerves.

23. *LITSEA CYLINDROCARPA*, Gamble in Kew Bull. 318 (1910). A spreading evergreen tree reaching 30 or 40 m. in height with a diam. of 90—120 cm. of stem; branchlets moderately stout, greyish, smooth, uppermost angular, minutely grey-puberulous as are the lanceolate buds and the inflorescence. *Leaves* coriaceous, alternate; elliptic or elliptic-oblong or -obovate, obtusely acute or rounded and very shortly apiculate or simply mucronate at apex, cuneate or attenuate at base; dark green and shining above when fresh, dull and brown and glabrous when dry except the prominently impressed midrib and main nerves, pale brown to glaucous and very minutely puberulous beneath; margins recurved; 9—18 cm. long, 4—9 cm. broad; midrib slender; main nerves 6—12 pairs, prominent, parallel, deeply impressed, starting at about 70° with the midrib and only slightly curving till close to the margin; transverse nervules many, straight, parallel but often hardly visible; reticulation not visible; petiole 10—25 mm. long, channelled and puberulous above. *Flowers* in rather long- (up to 1 cm.) pedunculate umbellules in axillary or lateral grey-pubescent racemes or clusters of racemes about 15—17 mm. long; raceme bracts ovate, acute, deciduous; involucre bracts ovate-orbicular, 4—5 mm. long, concave, glabrous within, at length spreading; flowers in each umbellule 5; pedicels short, tawny-villous; perianth-lobes oblong acute, very membranous, villous, 2—3 mm. long. *Stamens* of ♂ flowers very variable, 8—13, normally 9, those of the outer rows up to 5 mm. long with ovate anthers and slender villous filaments, sometimes with 1 or 2 glands

at the base; those of the inner rows shorter and biglandular, the glands rather small; rudimentary ovary rounded, villous; style slender; stigma oblique. *Staminodes* of ♀ flowers not known. *Fruit* cylindric-oblong, 2 cm. long, 7—9 mm. broad, obtuse at apex, seated on the cup-shaped rugose puberulous enlarged perianth-tube 5 mm. high, 7 mm. broad at the mouth; pedicel thick, flattened, 5 mm. long; pericarp red when ripe, rugose when dry; cotyledons oblong, base acute.

PENANG: at Batu Etam, 500 m., *Curtis* 787!. PROVINCE WELLESLEY: at Nibong Tibal, *Curtis* 3473!; at Krian, *Ridley* 9388!. PERAK: in dense jungle on low ground up to 30 m. alt., *King's Collector* 5500!, 5568!, 6207!, 6673!; at Bruas, *Burn-Murdoch* 211—DISTRIB. Java, Borneo (base of Matang, *Ridley* 11673!; near Kuching, *Haviland* 3297!).

24. *LITSEA WRAYI*, Gamble in Kew Bull. 319 (1910). An evergreen tree reaching 20—25 m. in height and up to 60 cm. in diameter of stem; branchlets slender, greyish-brown, uppermost darker, angled, slightly puberulous; leaf-buds lanceolate, grey-puberulous. *Leaves* chartaceous, alternate-elliptic; oblong, or oblong-lanceolate or -oblanceolate, acuminate at apex, long attenuate at base or more rarely acute; upper surface smooth, shining, glabrous, dark-brown, lower paler and reddish, glabrous or the youngest very slightly puberulous; margins slightly recurved, thickened; 10—17 cm. long, 3—5 cm. broad; midrib slender, slightly impressed above, raised beneath; main nerves 10—13 pairs, hardly impressed above, leaving the midrib at about 60° and curving at once obliquely upwards to and along the margin, the upper ones joining in loops; transverse nervules slender, irregular, often branched, enclosing the areolate reticulation; petiole slender, 15—25 mm. long, the upper half bordered by the decurrent margins of the blade. *Flowers* (buds only) in umbellules on slender villous or sub-glabrous peduncles 4—6 mm. long, single or fascicled or in very short (5 mm.) puberulous racemes, axillary or lateral on the upper branchlets; raceme bracts ovate, grey-puberulous, caducous; involucre bracts 4—5, villous without, glabrous within, the fifth when present obovate, the rest orbicular concave; flowers in each umbellule 5—6; perianth-lobes 6, villous without, oblong, obtuse or acute usually alternately. *Stamens* in ♂ flowers 12, glabrous, those of the outer rows with acute anthers, those of the inner rows obtuse and with a pair of sessile glands halfway up the filaments; rudi-

mentary ovary ovate with short style and cleft stigma. *Staminodes* of ♀ flowers also 12, glabrous, those of the outer rows clavate, those of the inner rows subulate with a pair of large sessile glands above the base. *Ovary* ovoid; style thick, curved; stigma capitate. *Fruit* globose with slightly conical blunt apex, 10 mm. in diam. seated on the enlarged spotted perianth-tube; cupule when young nearly globose enclosing the fruit with only a very small orifice, at length obconical enclosing only the lower half of the fruit, 8 mm. high and 12 mm. in diameter at the mouth, margin smooth; enlarged pedicel thick, slightly flattened, 4 mm. long; pericarp waxy white when fresh, yellowish when dry.

PERAK: at Waterfall Hill, *Wray* 1853!, 4036!; *Scortechini*!; in hill forests near Larut at 250—450 m. alt., *King's Collector* 6908!, 7569!.

25. *LITSEA SINGAPORENSIS*, Gamble in Kew Bull. 358 (1910). A tree (?), branchlets moderately stout, pale brown, glabrous; buds lanceolate, pubescent. *Leaves* coriaceous, alternate; oblong-lanceolate or -oblanceolate, obtuse or obtusely acute at apex, long-cuneately narrowed at base; margins recurved; upper surface smooth, shining, areolately reticulate, glabrous, pale brown when dry, lower also smooth and glabrous and lighter in colour; 15—30 cm. long, 4—7 cm. broad; midrib stout, flat or slightly raised above, raised beneath; main nerves 6—12 pairs, obscure and slightly impressed above, prominent beneath and conspicuous, curved to and along the margin; transverse nervules faint; reticulation areolate, fairly prominent on upper surface; petiole stout, rugose, 1.5—2 cm. long. *Flowers* in puberulous pedunculate (up to 13 mm.) umbellules in axillary or lateral thick racemes of about 1—4 and 7 mm. long; involucrel bracts 4, thin, orbicular, concave; flowers in each umbellule 5, on thick short pedicels; perianth-tube short, lobes spatulate, rusty-villous without. *Stamens* in ♂ flowers 12, those of the two inner rows biglandular (buds only available); staminodes of ♀ flowers not seen. *Fruit* depressed globose, apiculate, 15 mm. in diam., seated on a shallow rather thin hemispheric cupule 7 mm. high, 16 mm. broad; cupule broadening with age, rugose or pustulate without, margin smooth; enlarged pedicel short, 6—7 mm. long, stout; pericarp smooth, pale yellowish or greenish when dry.

SINGAPORE: at Bukit Timah, Toas, in Garden jungle and

Botanic Garden, *Ridley* 2118!, 3372!, 3894!, 4135!, 4826!, 5965!, 5736!; at Tanglin, *Hullett* 5738!—DISTRIB. Borneo, Bongaya river, *Ridley* 9075!

26. *LITSEA PERAKENSIS*, Gamble in Kew Bull. 359 (1910). A tree reaching 20 or more metres in height and 50 cm. in diam. of stem; branchlets nearly black when dry, striate, glabrous. *Leaves* sub-coriaceous, alternate; oblong, oblong-obovate or -oblanceolate, obtuse acute or acuminate at apex, attenuate at base; dark green above when fresh, olive-brown and shining when dry, bluish green beneath when fresh, sub-glaucous when dry, glabrous on both surfaces; margins recurved; 15–30 cm. long, 5–8 cm. broad; midrib stout, reddish, scarcely raised above, prominent beneath; main nerves 10–12 pairs, somewhat irregularly parallel, starting at about 50° with the midrib and curved gradually to and along the margin, the upper few looped so as nearly to rejoin the midrib at its tip; transverse nervules few, faint as is the reticulation; petiole stout, 1.5–3 cm. long, glabrous. *Flowers* in slenderly-peduncled (8–10 mm. long) umbellules in short axillary lateral or sometimes sub-terminal glabrous or minutely puberulous racemes about 8 mm. long; raceme bracts lanceolate, acuminate; umbellules (♂ only) up to 10 mm. broad when open; involucre bracts 4, orbicular, concave, glabrous within, 3–4 mm. in diam.; flowers in each umbellule 5; pedicels 2–3 mm. long; perianth-lobes oblong, obtuse or acute, ciliate at the tips, 3 mm. long. *Stamens* of ♂ flowers 9–12, usually 12, those of the outer rows 5–6 mm. long with obovate anthers and slender filaments slightly villous at base, those of the inner rows shorter with smaller anthers and a pair of rounded shortly stipitate glands near the base; lower anther-cells all lateral; rudimentary ovary short, with thick glabrous style and capitate stigma. *Staminodes* of ♀ flowers not known. *Fruit* glossy with white spots when fresh, yellowish when dry, globose, 1 cm. in diam., apiculate, seated on the shallow cup-shaped enlarged perianth-tube 5 mm. high and 10 mm. in diam. at the mouth; the cup and its very thick somewhat flattened 8–10 mm. long pedicel roughly tubercular.

PERAK: at Larut and Goping up to 250 m. alt., *King's Collector* 5114!, 6069!, 6085!. JOHORE: at Sungei Telrang, *Ridley* 13233!. SINGAPORE: at Bukit Timah, *Ridley* 14135!.

Kunstler describes this as a magnificent and rare tree.

27. *LITSEA PUSTULATA*, Gamble in Kew Bull. 359 (1910). A small or moderate-sized evergreen tree reaching 12 to 18 m. in height and 25—37 cm. in diam. of stem; branchlets stout with large pith, pale brown, smooth, striate when dry, uppermost slightly puberulous. *Leaves* subcoriaceous, alternate; elliptic-oblong or slightly obovate, rounded and with a short acumen at apex, broadly attenuate to rounded at base; upper surface shining, glabrous, lower bluish-green or slate-coloured when fresh, subglaucous when dry; margins recurved; 18—35 cm long, 8—14 cm. broad; midrib stout, flat above, raised beneath; main nerves 8—12 pairs, slightly impressed above, starting at from 50°—60° with the midrib and curving upwards to and along the margin, the uppermost nearly reaching the apex; transverse nervules many, faint, arched, enclosing the obscure areolate reticulation; petiole stout, 2—3 cm. long. *Flowers* in umbellules in short axillary or lateral racemes about 1 cm. long; rest not known. *Fruit* globose, slightly depressed, 15 mm. in diam., seated on the shallowly obconic patelliform enlarged very rugose spotted and pustulate perianth-tube, when young this is globose with a very small orifice and enclosing the fruit, later on it is hemispheric, finally patelliform 5—6 cm. long 12 cm. in diam., margin smooth; enlarged pedicel thick, also rugose and pustular, flattened, 8—12 mm. long; pericarp smooth, yellowish when dry.

PERAK: dense forests near Larut up to 250 m. alt., *King's Collector* 2544!, 3418!, 5140!.

28. *LITSEA PATELLARIS*, Gamble in Kew Bull. 360 (1910). A spreading evergreen tree reaching 12—18 m. in height and 20—30 cm. in diameter of stem; branchlets stout, smooth, brown, the uppermost puberulous; leaf-buds ovoid. *Leaves* sub-coriaceous, alternate; oblong or obovate, abruptly acuminate at apex, cuneate at base; upper surface smooth, shining, glabrous, lower bluish-green when fresh, grey-glaucous when dry, minutely puberulous when young afterwards glabrous; margins recurved; 20—40 cm. long, 7—14 cm. broad; midrib stout, plane above, much raised beneath; main nerves 8—10 pairs, slightly impressed above, prominent beneath, starting at about 50° with the midrib and passing obliquely with only a slight curve upwards to and along the margin where they end in small diminishing loops; transverse nervules many, arched, sometimes branching, enclosing the minutely netted reticulation; petiole stout, 2—3 cm. long. *Flowers* not known, but racemes axillary

very short. *Fruit* globose, slightly depressed, 10—12 mm. high, 15 mm. in diam., seated on the patelliform nearly flattened rugose enlarged perianth-tube 10—12 mm. in diam., margin smooth; pedicel rough, flattened, 7—8 mm. long with the cup; pericarp bright red when ripe, glossy, yellowish and wrinkled when dry.

PERAK: in dense forest at 150—250 m. alt. near Larut, *King's Collector* 7312!

29. *LITSEA FENESTRATA*, Gamble in Kew Bull. 360 (1910). A large evergreen tree reaching to 30 m. in height and a considerable girth of stem; branchlets very stout with pale brown bark, the uppermost angular and very minutely puberulous as are the lan- ceolate buds. *Leaves* pergamaceous, alternate; oblong or oblong- obovate, rounded or retuse at apex, attenuate or rounded and often unequal at base; upper surface more or less shining, pale olive-green; lower sub-glaucous; both glabrous except on the nerves beneath, areolate-reticulate; margins recurved, cartilaginous; 15—35 cm. long, 8—14 cm. broad; midrib very stout, nearly flat above, much raised beneath; main nerves 10—15 pairs, distant, slightly impressed above, raised beneath, starting at about 50°—60° with the midrib and curving to and along the margin; transverse nervules very irregular, branched, enclosing the areolate reticulation; petiole very stout, 1—2.5 cm. long, rugose. *Flowers* in umbellules on short (7 mm.) stout tawny-puberulous peduncles in thick dense clusters on the branches usually of 2-years' old wood; umbellules when open about 12 mm. in diam.; involucrel bracts 4—5, orbicular or obovate, concave, tawny-puberulous without, glabrous within; flowers in each umbellule 6—7 on pedicels about 4 mm. long; perianth-lobes 6, linear-oblong, obtuse, villous without, glabrous within, 4—5 mm. long, recurved in flower. *Stamens* of ♂ flowers variable in number, normally 12, those of the outer rows about 6—7 mm. long with elliptic decurrent anthers, very slender slightly villous filaments and occasional glands at the base; those of the inner rows shorter and furnished a little way above the base of the filaments with a pair of oblong bifid stipitate glands, cells all introrse; rudimentary ovary 0. *Staminodes* of ♀ flowers not known. *Fruit* globose, 22 mm. in diam., at first completely enclosed in the turbinate, woody, truncate-pear-shaped, pale brown, furfuraceous, enlarged perianth tube, later on about 20 mm. long, the orifice circular, 10—12 mm. in diam., finally the orifice opening to nearly 25 mm., the fruit $\frac{1}{2}$ — $\frac{2}{3}$ exsert; enlarged pedicel very stout,

5 mm. long; pericarp very thick, waxy-white outside when fresh, later purple.

PERAK: in dense jungle near Larut up to 250 m. alt., *King's Collector* 5938!, 6859!.—DISTRIB. Sumatra at 450 m. alt., *Forbes* 3174!. Borneo, near Kuching, *Haviland* 3088 probably.

30. *LITSEA FOXIANA*, Gamble in Kew Bull. 361 (1910). A medium-sized tree; branchlets stout, rough, pale grey, uppermost angular, minutely rusty-pubescent as are the linear-lanceolate buds, the petioles and midribs of the leaves and the inflorescence. *Leaves* subcoriaceous, alternate; elliptic or elliptic-oblong or -obovate; long cuspidate-acuminate at apex, attenuate at base; dark brown and dull and glabrous except on the prominently impressed midrib and main nerves on the upper surface, glaucescent and minutely puberulous on the lower surface; margins recurved; 10–20 cm. long, 5–7 cm. broad; midrib stout, prominent; main nerves 12–16 pairs, parallel, prominent, the lowest pair marginal, at an angle of about 60° with the midrib and curving only near the margin, the upper 2 or 3 meeting in loops below the cusp; transverse nervules many, straight, regular, parallel but faint; reticulation obscure; petiole thick, 2–3 cm. long. *Flowers* in slenderly pedunculate (about 6 mm. long) umbellules in grey-pubescent axillary or lateral racemes up to 2 cm. long in ♂, 5 mm. in ♀, the racemes sometimes in fascicles of 2–3; raceme bracts very small, deciduous; involucre bracts 4, orbicular, concave, 4–5 mm. in diam.; open umbellules nearly 10 mm. in diam. in ♂, 8 mm. in ♀; flowers in each umbellule 5–6; pedicels short or almost 0; perianth-lobes oblong, obtuse or acute, villous, ciliate, ♂ 3 mm. ♀ 1.5–2 mm. long. *Stamens* of ♂ flowers variable in number, 8–10, normally 9, the outer rows 3–4 mm. long, with ovate anthers and slender villous filaments, those of inner rows shorter with a pair of rather small sessile glands near the bases of the filaments; rudimentary ovary 0. *Staminodes* of ♀ flowers also very variable, but normally 9, those of outer rows clavate, 2–3 mm. long, with villous filaments, those of inner rows shorter, subulate, with a pair of rather large ovate glands a little above the base. *Ovary* globose, glabrous; style thick, curved; stigma large, lateral, long-bifid. *Fruit* not known.

PENANG: at Moniot's road, *Curtis* ♂ 2305! and ♀ without number!

31. *LITSEA MONTICOLA*, Gamble in Kew Bull. 361 (1910). A tree reaching 12—15 m. in height and 45—60 cm. in diam. of stem; branchlets stout with pale brown bark, sub-quadrangular, scurfy and nearly glabrous, the small terminal buds only minutely pubescent. *Leaves* coriaceous, alternate; elliptic or elliptic-oblong or -obovate, acute or acuminate and slightly mucronate at apex, attenuate at base; both surfaces glabrous, olive-brown when dry and somewhat reddish beneath; margins recurved; 10—20 cm. long 4—6 cm. broad; midrib prominent, impressed above; main nerves 8—12 pairs, subparallel, the lowest pair marginal, impressed above, raised beneath, at about 50° with the midrib, curving gently to the margin and a little parallel to it; transverse nervules straight, subparallel, obscure as is the areolate reticulation; petiole stout, black when dry, glabrous, channelled above, 15 mm. long. *Flowers* in umbellules on rather stout, 6—8 mm. long, glabrous peduncles, in thick angled puberulous up to 20 mm. long 8—10-flowered axillary or lateral racemes; involucre bracts 4, orbicular, glabrous except the ciliate margins of the 2 inner, 4—5 mm. in diam.; flowers in each umbellule 5, densely golden-tawny-villous; perianth-lobes 6, ovate-acute or -acuminate, densely villous without, glabrous within, gland-dotted. *Stamens* of ♂ flowers variable in number and arrangement, 8—13, but normally 9; those of outer rows 3 mm. long with oblong anthers and filaments densely villous with long hairs, those of inner rows shorter and with a pair of large ovate subsessile glands near the base of the filaments; lower anther-cells lateral; rudimentary ovary 0. *Staminodes* of ♀ flowers and fruit not seen.

PERAK: on the top of Gunong Ejon at 1200—1400 m. alt., and near Thaiping 1000—1200 m., *King's Collector* 7000!, 8454!

This species comes rather near to *L. Foxiana*, but the leaves are not so long acuminate nor glaucous beneath nor pubescent, the racemes are short, the umbellules are glabrous instead of grey-pubescent, the flowers inside the involucre bracts are densely tawny villous, instead of being merely sparsely so, and the main nerves are more distant.

32. *LITSEA SCORTECHINII*, Gamble in Kew Bull. 362 (1910). A tree?; branchlets chestnut-brown, ferruginous-puberulous, somewhat angled; buds lanceolate, golden-pubescent, as in the inflorescence. *Leaves* chartaceous, alternate; lanceolate or elliptic-lanceolate, long and sharply acuminate at apex, long-attenuate at base; upper surface glabrous except on the nerves, minutely reticulate; lower

faintly ferruginous-pubescent, more strongly so on the nerves; 10—17 cm. long, 4—6 cm. broad; midrib slender but prominent, deeply impressed and puberulous above, raised beneath; main nerves 6—10 pairs, impressed above, the pairs sub-opposite, curved to and along the margin, the upper ones joining in loops; transverse nervules many but faint; joined by a minutely areolate reticulation; petiole slender, 1—2 cm. long. *Flowers* in umbellules on rather short (2—3 mm.) peduncles in very short (3—5 mm.) axillary or lateral racemes, the whole shorter than the petiole; involucre bracts 5, membranous, glabrous inside, the margins fimbriate, 4 usually orbicular and concave, 1 lobovate; flowers in each umbellule 5; perianth-lobes oblong, densely golden-villous without. *Stamens* normally 9 with much villous hair at the base, the filaments slender, the anthers subquadrate obtuse, the 3 inner with a pair of sessile oblong glands about halfway up the filaments. *Staminodes* of ♀ flowers and fruit unknown.

PERAK: at Haram Parah, *Scortechini* 866!

33. *LITSEA OCHRACEA*, Boerl. Handl. Fl. Ned. Ind. 144 (1900). A tree with spreading branches reaching 15—20 m. in height and 60—90 cm. diam. of stem; branchlets rather stout, greyish brown, somewhat angled, uppermost darker, innovations minutely tawny-puberulous, as is the inflorescence; buds lanceolate. *Leaves* chartaceous, alternate; oblong-lanceolate or oblanceolate, shortly acuminate at apex, long-narrowed at base; upper surface dull, olive brown when dry, glabrous, lower ashy-glaucous, sometimes slightly puberulous especially along the nerves; 12—28 cm. long, 4—8 cm. broad; midrib stout, flattened above, raised beneath; main nerves 7—10 pairs starting at about 40°—50° with the midrib and curving upwards to and along the margin; transverse nervules many, more or less prominent beneath in a network of reticulation; petiole rather slender, glabrous, 12—20 mm. long. *Flowers* in very slenderly (10—12 mm. long) peduncled umbellules, corymbosely seated about 10—12 together on 8—15 mm. long axillary or lateral racemes (♀ shorter than ♂); umbellules of ♂ about 8—10 mm. broad when open, of ♀ smaller; involucre bracts 4, orbicular-ovate, concave, puberulous without; pedicels slender, about 1—5 mm. long; flowers, in each umbellule 6; perianth-tube in ♂ 1 mm. long, lobes ovate, ciliate, 2—5 mm. long. *Stamens* of ♂ flowers normally 12, those of the outer rows 2—5 mm. long with elliptic-oblong anthers and

slightly villous filaments, those of the inner rows shorter with a pair of ovate stipitate glands about halfway up the filaments; rudimentary ovary conical, glabrous. *Staminodes* of ♀ flowers (rather imperfect) 12, clavate, nearly glabrous, the inner ones with a pair of large glands somewhat above the base. *Ovary* ovoid, glabrous; style thick; stigma peltate. *Fruit* a globose berry half-enclosed in the cup-shaped tuberculate sulcate enlarged perianth-tube, 10 mm. broad at the mouth, 5 mm. high, the margin crenately lobed; enlarged peduncle thickened, 6 mm. long. *Cylicodaphne ochracea*, Blume Mus. Bot. Lugd.-Bat. II. 13; Meissn. in DC. Prodr. XV. 1. 205. *Lepidadenia ochracea*, Miq. Fl. Ind. Bat. I. i. 938.

PERAK: at Chanderiang and Goping, from about 100—250 m. alt., *King's Collector*, 5666!, 5959!; *Scortechini*?! —DISTRIB. Sumatra (*Korthals*).

34. *LITSEA OBLANCEOLATA*, Gamble in Kew Bull. 362 (1910). A small evergreen tree reaching about 10—12 m. in height and with a diameter of stem of 45 cm.; branchlets pale brown, slender, lenticellate, with raised vertical lines below the nodes and leaves; innovations and leafy buds rusty-puberulous as is the inflorescence. *Leaves* chartaceous, alternate; oblanceolate, obtuse at apex with a short abrupt acumen, long-cuneately-narrowed at base; both surfaces glabrous, dull, upper pale brown when dry, lower sub-glaucous; 10—23 cm. long, 3—6 cm. broad; midrib rather slender, slightly raised above, more so beneath; main nerves 8—10 pairs, impressed above, starting at an angle of about 40° with the midrib and at once curving obliquely to and along the margin; transverse nervules fairly regular and straight but obscure; reticulation scarcely visible; petiole slender, twisted, 10—15 mm. long, bordered above by the decurrent margins of the blade. *Flowers* in sessile umbellules on very short (at most 7 mm. long) axillary or lateral thick racemes; raceme bracts ovate, rusty tomentose; involucre bracts 4, orbicular, concave; flowers in each umbellule 4—5, on slender pedicels 2 mm. long; perianth-lobes spreading, ovate, obtuse, glabrous within, 2 mm. long. *Stamens* of ♂ flowers 9—12, slender, glabrous, those of the outer rows exsert, those of the inner rows shorter and with a pair of sessile oblong glands a little above the base of the filaments; rudimentary ovary very small, with slender style and small bifid stigma. *Staminodes* of ♀ flowers and *fruit* not known.

PERAK: chiefly in moist places near Larut up to 90 m. alt., *King's Collector* 1952!, 2020!

This species is distinguished from *L. ochracea* chiefly by the oblanceolate leaves, very much shorter racemes and sessile umbellules; but they are very close to each other.

35. *LITSEA KUNSTLERI*, Gamble in Kew Bull. 363 (1910). An evergreen tree reaching 18 m. in height and about 50 cm. in diam. of stem; branchlets stout, angular from raised lines decurrent from the leaves, dark grey or glaucous, glabrous; buds lanceolate. *Leaves* chartaceous, alternate; oblong or oblong-lanceolate, rounded or emarginate at apex, attenuate and somewhat rounded at base; when fresh dark green above, bluish-green beneath, when dry olive-brown above, sub-glaucous beneath, both surfaces glabrous, areolate-reticulate; 15—30 cm. long, 6—12 cm. broad; midrib rather slender, slightly channelled above, raised beneath; main nerves 12—14 pairs, slender, rather irregular, starting at from 50°—60° with the midrib and curved upwards to near the margin and along it, fading off in small loops, slightly impressed above; transverse nervules irregular, branched, enclosing the areolate reticulation; petiole stout, glabrous, channelled above, 1—2 cm. long. *Flowers* in grey-puberulous umbellules on slender 8 mm. long peduncles, fascicled in very short thick axillary or lateral racemes up to 10 mm. long and about 10 together; raceme bracts ovate, caducous; umbellules (♂) when open about 12 mm. broad; involucre bracts 4—6, usually 6, the outer orbicular, the inner obovate, glabrous within; flowers in each umbellule 7; pedicels 2 mm. long; perianth-tube funnel-shaped, lobes 6, variable, usually oblong or obovate, 3—4 mm. long, glabrous within, pubescent without, gland-dotted. *Stamens* of ♂ flowers 12, those of the outer rows eglandular, up to 4 mm. long with ovate anthers and slender slightly villous filaments, those of the inner rows shorter and with a pair of rather large reniform shortly stipitate glands near the base, lower anther-cells all lateral; rudimentary ovary very small with slender style. *Staminodes* of ♀ flowers and *fruit* not known.

PERAK: near Gunong Pondo and Gunong Bubu, up to 250 m. alt., *King's Collector* 7527!, 7670!

36. *LITSEA CLAVIFLORA*, Gamble in Kew Bull. 363 (1910). A tree, reaching 10—12 m. in height and 20—12 cm. in diam. of stem; branchlets slender, pale brown, glabrous except the uppermost shoots, innovations and inflorescence which are minutely puberulous. *Leaves* chartaceous, alternate; elliptic-lanceolate or -oblanceolate, shortly acuminate at apex, narrowed at base; upper surface olive-green

when dry, dull, lower glaucous; 10—18 cm. long, 4—8 cm. broad; midrib slender, impressed above, raised beneath; main nerves about 6 pairs, impressed above, starting at about 40° with the midrib and curved to and along the margin where they become looped; transverse nervules prominent, distant, joined again transversely in a network, prominent beneath; petiole rather slender, 8—10 mm. long. *Flowers* in rather long (1—2 cm.)-peduncled subglabrous umbellules 2—3 together in a very short raceme in the axils of the upper leaves or of fallen leaves; umbellules (♂ only) about 7 mm. broad when open; involucre bracts 4, orbicular, concave, 4 mm. broad; flowers 5 in each umbellule; perianth-tube short, villous within, lobes 6, oblong, obtuse, glabrous except at base within and outside, prominently gland-dotted, 2 mm. long. *Stamens* of ♂ flowers 12, those of the outer rows 3—4 mm. long with elliptic anthers and slender villous filaments, those of the inner rows shorter with oblong obtuse anthers and a pair of large sessile quadrate glands near the bases of the filaments; rudimentary ovary conical, glabrous. *Staminodes* of ♀ flowers and *fruit* unknown.

PERAK: near Thaiping in dense forest at 150—300 m. alt., *King's Collector* 8492!.

This species somewhat resembles *L. gemelliflora*, Boerl. (*Tetranthera gemelliflora*, Miq.); but that species has much thinner leaves and almost filiform peduncles, rarely more than two together on the extremely short rachis.

37. *LITSEA HELFERI*, Hook. f. in Fl. Br. Ind. V. 172 (1886).—
DISTRIB. Tenasserim (or Andaman Islands) *Helfer*, K.D. 4307.

Var. *ovata*, Gamble. A tree; branchlets rather slender, dark brown, glabrous. *Leaves* subcoriaceous; ovate or elliptic, acuminate at apex, attenuate at base, upper surface olive-brown when dry, glabrous, lower glaucescent, glabrous except along the nerves; 5—11 cm. long, 3—6 cm. broad; midrib rather stout, main nerves 4—6 pairs curved to anastomose near the margin, slightly impressed above; transverse nervules prominent, joined by a prominent reticulation; petiole stout, 5—7 mm. long. *Flowers* in subglabrous umbellules on peduncles 5 mm. long, 1—3 together on extremely short tubercles in the axils of the leaves; involucre bracts reflexed in flower; flowers 4—5 in each umbellule. *Stamens* 12, the 6 of the 3rd and 4th rows biglandular, filaments glabrous; anthers subquadrate; rudimentary ovary ovoid; with a slender style. *Staminodes* of ♀ flowers and *fruit* not known.

PERAK : at Ulu Batang Padang, Wray 1600!

This may prove to be a distinct species when more and better specimens are obtainable.

38. *LITSEA MYRISTICÆFOLIA*, Hook. f. Fl. Br. Ind. V. 172 (1886). An evergreen tree reaching 15 to 18 ft. in height and 30 to 40 cm. in diameter of stem; branchlets moderately stout, grey, the uppermost nearly black when dry; buds lanceolate, leafy; all parts quite glabrous. *Leaves* coriaceous, alternate; elliptic-oblong or lanceolate or obovate, obtuse or obtusely acute or acute at apex or sometimes retuse, cuneate or attenuate at base; upper surface bright green and glossy when fresh, olive brown and dull when dry, lower dull and subglaucous; margins recurved; 8—23 cm. long, 3—7 cm. broad; midrib deeply impressed above, raised prominently beneath; main nerves 6—12 pairs, immersed and faint, curved upwards to and along the margin, transverse nervules and reticulation not apparent; petiole stout, 1—2 cm. long, channelled above. *Flowers* glabrous, in long- (1—2 cm.) peduncled umbellules, single or in pairs or many (up to 12) together on short racemes axillary or lateral on the upper branchlets; umbellules when open up to 10 mm. broad in ♂, 7 mm. in ♀; involucre bracts 4—6, orbicular, concave, reflexed; flowers in each umbellule usually 6, shortly pedicelled; perianth-tube short, lobes 6, oblong, obtuse, obscurely toothed, 3—4 mm. long in ♂ shorter in ♀, gland-dotted. *Stamens* in ♂ flowers 9—12, those of the two outer rows about 3 mm. long with ovate anthers and slender filaments, eglandular or sometimes with 1—2 small glands; those of the two inner rows shorter with oblong anthers and a pair of large reniform stipitate glands above the bases of the filaments; rudimentary ovary in 9-stamened flowers ovoid with curved style and peltate stigma, in 12-stamened flowers 0. *Staminodes* in ♀ flowers 9 to 12, usually 12, the outer 2 rows oblong clavate 2.5 mm. long, the inner two rows similar but shorter and with a pair of large reniform glands at the base. *Ovary* ovoid; style thick, much curved; stigma large, peltate, 3-lobed. *Fruit* globose, 8 mm. in diameter, half-immersed in the cupular fleshy enlarged perianth-tube 1 cm. long, 8 mm. broad at mouth; enlarged pedicel clavate, nearly at right angles with the cupules and up to 2.5 cm. long when dry; pericarp smooth. Brandis Ind. Trees 538. *Tetranthera myristicæfolia*, Wall. Cat. 2548; Nees in Wall. Pl. As. Rar. II. 67, III. 31, and Syst. Laur. 555; Kurz For. Fl. II. 302 (excluding var. 2); Miq. Fl. Ind. Bat. I. 1. 957. *Cylicodaphne*

myristicaefolia, Meissn. in D.C. Prodr. XV. 1. 208. *C. oblonga*, var. γ *Griffithii*, Meissn. l.c. 205. *Lepidadenia Griffithii*, Wight Ic. t. 1846. *Diospyros* ? *acuminata*, Wall. Cat. 4129.

PENANG: *Wallich* 2548!; *Porter* (*Wallich* 4129); at Waterfall, etc., *Curtis* 769!, 1079!; on Penang Hill, *Ridley* 7071!; at 250—350 m. alt., *King's Collector* 5204!. MALACCA: *Griffith* K.D. 4282!; *Cumming* 2321!; *Maingay* K.D. 1254!, 1267!; at Kwala Linggi, etc., *Derry* 97!, 416!, 1008!; at Sungli Hudang, *Goodenough* 1681!, *Ridley* 1603!, *Holmberg* 690!; at Alor Gajah, *Ridley* 10026!. PAHANG: at Telom ridge, *Ridley* 13725!. SINGAPORE: *Ridley* 4824!, 5973!, 6096!, 13331!.—DISTRIB. Burma.

39. LITSEA TEYSMANNI, Gamble in Kew Bull. 319 (1910). An evergreen tree; branchlets rather stout with pale brown lenticellate bark, uppermost blackish, glabrous or slightly puberulous; leaf-buds lanceolate, grey-puberulous. *Leaves* coriaceous, alternate, glabrous; elliptic-oblong or -obovate, obtuse or abruptly cuspidate-acuminate at apex, acute at base and often unequal; upper surface shining, olive-brown, lower paler, reddish-grey, dull; margin slightly recurved; 10—17 cm. long, 4—6 cm. broad; midrib moderately stout, raised beneath; main nerves 8—12 pairs, slender, scarcely visible above, more so beneath, at an angle of 50° with the midrib, curving upwards to and along the margin, the upper ones meeting in loops; transverse nervules irregular, branched, enclosing the rather widely netted reticulation; petiole stout, 1.5—3 cm. long, the upper part bordered by the decurrent margins of the blade. *Flowers* in umbellules on slender glabrous 4—6 mm. long peduncles in slender axillary racemes 2—5 cm. long; rhachis glabrous, angular, nearly black; involucre bracts 4, very minutely puberulous or glabrous; flowers in each umbellule (\varnothing only) 5, pedicels villous, 1 mm. long; perianth-tube villous without, glabrous within except at the mouth; lobes variable, usually oblong, obtuse, slightly villous without, glabrous within, 1 mm. long. *Stamens* of σ flowers not seen. *Staminodes* of \varnothing flowers 12, the 6 outer clavate with slightly villous filaments, the 6 inner subulate rounded or acute at apex, with a pair of large ovate glands at the base. *Ovary* ovoid; style thick, curved then straight; stigma peltate, 3-lobed. *Fruit* ovoid at first, afterwards globose, 15—18 mm. in diam., the base enclosed in the rugose sulcate enlarged perianth-tube, at first cup-shaped, afterwards flattened, 12 mm. high including the somewhat flattened peduncle 15 mm. in diameter, the margin undulate; pericarp spotted when fresh, rugose when dry.

PERAK : at Kotah and Simpang, Wray 2409!, 3019!; in dense jungle on low ground, King's Collector 6689!. MALACCA : at Merliman, Ridley 5845!.—DISTRIB. Bangka (*Teysmann*)!; Borneo at Sarawak (*Beccari* 1649!, 4061!).

The specimens King's Collector 6689 and Beccari 4061 have usually thicker and broader and more obtuse even emarginate leaves, but the fruits are identical with the rest and some of the leaves are acute, and it does not seem to me expedient to propose a variety.

40. *LITSEA MACHILIFOLIA*, Gamble in Kew Bull. 320 (1910). An evergreen tree, reaching 12 to 24 m. in height and about 40—50 cm. in diam. of stem; branchlets slender, dark grey to nearly black when dry; leaf-buds linear, minutely grey-puberulous. *Leaves* coriaceous, alternate; oblong-lanceolate, long acuminate at apex, acute or cuneate often unequally at base; upper surface shining, glabrous, lower glaucescent when young, very minutely puberulous; margins slightly recurved; 10—20 cm. long, 3—7 cm. broad; midrib slender, slightly raised above, more so beneath; main nerves obscure, 10—15 pairs, immersed, at about 60° with the midrib and curving upwards to join near the margin in faint loops; transverse nervules few, very faint and irregular, enclosing the minutely areolate reticulation; petiole slender, black when dry, 1—2 cm. long. *Flowers* in umbellules on slender peduncles 4—5 mm. long, in slender panicle glabrous axillary or subterminal often leafy racemes, the racemes 7—9 cm. long in ♂, 3—5 cm. in ♀; rhachis angular, black; raceme bracts small, ovate, caducous; umbellules when open 8 mm. broad in ♂, 6 mm. in ♀: involucre bracts 4, sometimes 5, orbicular, glabrous, the inner slightly fimbriate or lobed; flowers in each involucre 5, very small; pedicels about 1 mm. long, very slightly villous: perianth-tube in ♀ 1—1.5 mm. long, glabrous within except a few hairs at the mouth; lobes 6—8, very variable in size and shape, those of ♂ up to 2 mm. long, of ♀ to 1 mm., often lobed or ciliate, prominently gland-dotted. *Stamens* in ♂ flowers 9—13, usually 12, glabrous, those of outer rows 2—3 mm. long with ovate anthers, those of inner rows shorter with a pair of large shortly stipitate glands, a third above the base of the filaments; rudimentary ovary ovoid; style slender; stigma cleft. *Staminodes* of ♀ flowers 12—14, normally 12, those of the outer rows clavate acuminate, and 1 mm. long, those of inner rows subulate with a pair of sessile not very large glands at their middle. *Ovary* ovoid, glabrous; style thick, curved; stigma capitate. *Fruit* globose, 10 mm. in diam., half sunk in the hemispheric enlarged

perianth tube about 8 mm. high and 12 mm. in diam. at the mouth, margin smooth; enlarged pedicel clavate, flattened, 10—12 mm. long; pericarp smooth, yellowish.

PENANG: Moniot's road at 300 m. alt., *Curtis* 795!. PERAK: *Scortechini*! SINGAPORE: garden jungle, *Ridley* 4706!, 3458!.

Var. *angustifolia*, Gamble. *Branchlets* grey. *Leaves* usually smaller and narrower, 2.5—5 cm. broad; panicles much more branched. *Flowers* smaller; involucre and rhachis sometimes slightly puberulous especially in ♀; stamens usually 9; perianth-lobes with fewer and larger glandular dots. *Fruit* globose, 15—17 mm. in diam., seated on the rugose fleshy orange-coloured nearly flat enlarged perianth-tube, which is finally about 2 mm. thick and 15 mm. in diam.; enlarged pedicel much flattened and curved 14—20 mm. long; pericarp when fresh green and spotted, when dry yellowish and wrinkled.

PERAK: Gunong Batu Pateh, at 1000 to 1400 m. alt., *Wray* 416!, 985!, 1032!, 1108!; at Gunong Haram, *Scortechini* 326!, 588!; on low ground and hills up to 250 m. alt. at Larut and Gopeng, *King's Collector* 3561!, 6113!, 6815!. SELANGOR: at Bukit Kutu at 900 m. alt., *Ridley* 7633!. MALACCA: at Brisu, *Derry* 653!. SINGAPORE: at Bukit Mandai, *Ridley* 6739!; *King's Collector* 1236!.

The available specimens show the fruits of the *species* not quite ripe, so the cupule may possibly flatten out as it does in the *variety*. *Wray* says that the flowers have the scent of the garden "Syringa" (*Philadelphus*.) *Scortechini*'s specimens 328 have the rhachis of the inflorescence rather thicker and more puberulous.

41. LITSEA PANAMONJA, Hook. f. in Fl. Br. Ind. V. 175 (1886). A large evergreen tree, reaching 12 m. in height (*Curtis*) or more; branchlets moderately stout, greyish brown, with small lenticels and channels decurrent from below the leaf-bases, uppermost minutely grey-puberulous as are the lanceolate leaf-buds and the inflorescence. *Leaves* chartaceous, alternate; elliptic-oblong or oblong-lanceolate or -oblanceolate, acute or shortly acuminate at apex, acute at base, sometimes almost rounded; upper surface glabrous, olive-brown, lower paler, minutely grey-puberulous; 10—20 cm. long, 4—5 or even to 9 cm. broad; midrib slender, immersed or slightly impressed above, raised beneath; main nerves 10—14 pairs, slender, slightly impressed above, at an angle of about 55° with the midrib, curved upwards to and along the margin; transverse nerves obscure,

irregular and branched, enclosing an irregular reticulation; petiole rather slender, 1—2 cm. long, channelled above. *Flowers* in umbellules on rather stout peduncles 5—6 mm. long in grey-puberulous elongate often leafy racemes up to 17 cm. long in ♂, axillary to the upper leaves or the scars of fallen leaves; rhachis angled; raceme bracts small, ovate, very caducous; umbellules of ♂ when open 8 mm. in diam.; involueral bracts 4—5, the fifth when present ovate the rest orbicular concave, reflexed in flower; flowers in each umbellule 6; pedicels slender, 2 mm. long; perianth-lobes thin, variable in size and shape, usually oblong, acute or obtuse, villous without, glabrous within, gland-dotted, ciliate, 2.5—4 mm. long. *Stamens* in ♂ flowers 12, exsert, those of the outer rows 4 mm. long with oblong obtuse anthers and slender slightly villous filaments, those of the inner rows rather shorter with acute anthers and a pair of reniform lobed stipitate glands at the bases of the filaments; anther cells all introrse or the lower lateral; rudimentary ovary very small with slender style and bifid stigma. *Staminodes* of ♀ flowers and fruit not known. *Tetranthera Panamonja*, Ham. in Wall. Cat. 2553 A. B.; Nees in Wall. Pl. As. Rar. II. 67 and Syst. Laur. 561, 677; Meissn. in DC. Prodr. XV. 1. 197; Kurz For. Fl. II. 302.

PERAK: Waterloo new road, at 450 m. alt., *Curtis* 26941.

MALACCA: at Hulu Chambong, *Derry* 1002!—DISTRIB. India, (Assam), Burma.

This seems to be var. *β longiracemosa*, Meissn. l. c.

42. LITSEA CURTISH, Gamble in Kew Bull. 363 (1910). A large evergreen tree with spreading branches reaching 24—30 m. in height and 60—90 cm. in diam.; branchlets rather stout, stiff, sharply angled, almost winged, black when dry; buds lanceolate, grey-puberulous. *Leaves* submembranous, alternate; elliptic or elliptic-obovate, rounded and very short acuminate, sometimes emarginate at apex, shortly attenuate and subcuneate at base; both surfaces glabrous, upper olive-brown to nearly black when dry, lower subglaucous; 15—26 cm. long, 6—11 cm. broad; midrib stout, broad, immersed above, raised beneath; main nerves 13—15 pairs, plane or slightly impressed above, slightly raised beneath, subparallel, starting at about 60° with the midrib, at first straight then curving to and along the midrib and breaking up in faint loops; transverse nervules distant, straight or slightly arched, very faint, enclosing the

minute but obscure reticulation; petiole rather thick, black when dry, straight, about 2—2.5 cm. long. *Flowers* in umbellules on peduncles about 6 mm. long, rather distantly arranged along the slender angular glabrous or slightly puberulous rachises of axillary or lateral or sometimes subterminal occasionally leafy racemes, reaching 10—25 cm. in length in ♂, barely 10 cm. in ♀; raceme-bracts minute, very caducous; umbellules ♂ when open 1 cm. broad, ♀ narrower; involucre bracts 4, glabrous or very minutely puberulous, orbicular, concave, spreading in flower; flowers in each umbellule 5—6; perianth-tube funnel-shaped, 2.5 mm. long, villous inside; lobes 6—9, unequal, membranous, nearly glabrous, usually obovate acute, 3.5 mm. long or less in ♀. *Stamens* of ♂ flowers 9 to 14 or perhaps more, normally (apparently) 9, glabrous; those of the outer rows about 4 mm. long with ovate often apiculate anthers and slender filaments, sometimes bearing glands at the base; those of the inner rows shorter with a pair of large more or less reniform lobed stipitate glands near the base; rudimentary ovary very small, ovoid, with minute style, enclosed in the perianth-tube. *Staminodes* of ♀ flowers 12—16, those of outer rows spatulate, gland-dotted, those of inner rows subulate with a pair of large sessile glands about halfway up. *Ovary* ovoid, glabrous; style very thick, curved; stigma peltate. *Fruit* not known.

PENANG: at cooly lines, Government Hill, at 360 m. alt., *Curtis* 2449!. PERAK: in dense jungle near Larut at 90—150 m. alt., *King's Collector* 6161!; *Scortechini* 162!.

48. *LITSEA NIDULARIS*, Gamble in Kew Bull. 365 (1910). A large evergreen tree reaching 25—30 m. in height and 90—120 cm. in diam. of stem; branchlets stout, pale brown, smooth, striate when dry, with prominent leaf-scars; buds ovate, acuminate, glabrous, 1 mm. long. *Leaves* coriaceous, alternate, glabrous; oblanceolate or elliptic-obovate, rounded and sometimes emarginate at apex, long cuneate, alternate or sometimes rounded at base; upper surface shining, lower bluish-green when fresh, reddish glaucescent when dry; margins much recurved; 10—25 cm. long, 4—10 cm. broad; midrib moderately stout, channelled above, much raised beneath; main nerves 10—12 pairs, impressed above, at from 50°—60° with the midrib, at once curved to and along the margin where they end in a faint series of loops; transverse nervules rather distant, straight or arched, often branched, enclosing the prominent minutely

areolate reticulation; petiole stout, 15—25 mm. long. *Flowers* in umbellules on slender glabrous peduncles up to 15 mm. long, distantly arranged in slender racemes about 10 cm. long in ♂, scarcely 4 cm. in ♀, axillary or lateral from above the scars of fallen leaves; umbellules when open 8—10 mm. in diam. in ♂, 5 mm. in ♀; involucre bracts 4, glabrous, orbicular, concave, reflexed in flower; flowers in each umbellule 4—5 on very short (2 mm.) pedicels; perianth-lobes 6—8 in ♂, 4—6 in ♀, oblong, acute or obtuse, sparsely villous, 3 mm. long. *Stamens* of ♂ flowers 12—16, normally 12, those of the outer rows 5 mm. long with subquadrate anthers and slender sparsely villous filaments; those of the inner rows shorter with obovate anthers and a pair of large lobed shortly stipitate glands near the bases of the filaments, lower anther-cells lateral; rudimentary ovary conical, glabrous, long, those of inner rows shorter thicker with a pair of large nearly orbicular stipitate glands at the base. *Ovary* ovoid; style rather thick; stigma large, peltate, lobed. *Fruit* waxy, deep yellow in colour, depressed globose, apiculate, 14 mm. in diam., 7—8 mm. high, almost included in the rather shallow nest-like cupule formed by the enlarged perianth-tube, the cupule rugose without, under 10 mm. high and 18—20 mm. in outer diameter, the margins incurved leaving an orifice 10—12 mm. in diameter; enlarged pedicel clavate, flattened, 1 cm. long; pericarp shining, smooth when dry.

PENANG: on Government Hill, 650 m., *Curtis* 3279! in herb. Penang. PERAK: in dense jungle near Larut at 250—300 m. alt., *King's Collector* 6885!; at Hulu Kenat, *Scortechini* 759!.

44. *LITSEA MEGACARPA*, Gamble in Kew Bull. 364 (1910). A large spreading evergreen tree reaching 18 to 24 m. in height and occasionally 30 or even 36 m., with a considerable diameter of stem; branchlets stout, brown, somewhat shining, with prominent leaf-scars and occasional lenticels, the uppermost angular, often nearly black when dry, glabrous as are the lanceolate buds. *Leaves* coriaceous, alternate, glabrous; elliptic-oblong, or -obovate, obtuse and apiculate rarely cuspidate at apex, attenuate at base for the lower two-thirds sometimes rounded, often unequal; upper surface dark green and glossy when fresh, shining olive-brown when dry, lower paler, cinereous when dry; margins slightly recurved; 15—45 cm. long, 7—20 cm. broad; midrib stout, immersed above, raised beneath; main nerves 10 to 15 pairs, rather distant, irregular,

slightly impressed above, starting at from 50° — 60° with the midrib and curving to and along the margin; transverse nervules obscure, distant, irregular and branched, enclosing the prominent minutely areolate reticulation; petiole stout, curved, 1.5—6 cm. long, channelled above. *Flowers* in umbellules on slender puberulous peduncles 5—20 mm. long, in slender axillary or lateral racemes reaching 10—15 cm. long in σ , and 5—10 cm. in φ , the rhachis angular, puberulous or glabrescent; raceme bracts minute, ovate, caducous; umbellules when open 10 mm. broad in σ , 5 mm. in φ ; involucre bracts 4, orbicular, concave, puberulous without, the inner fimbriate on the margins; pedicels slender, silky-villous, 1—5 mm. long; flowers in each umbellule 4—5; perianth-tube funnel-shaped, 1—5 mm. long, villous; lobes 6, ovate acuminate, 2 mm. long, sparsely villous without, those of φ scarcely 1 mm. long. *Stamens* of σ flowers 9—12, usually 12, glabrous except at base, those of the outer rows 4 mm. long with oblong anthers and slender filaments, those of the inner rows shorter with a pair of large variously lobed sessile or stipitate glands from just above the base of the filaments; rudimentary ovary 0 or very small, conical with capitate stigma. *Staminodes* of φ flowers also 12, glabrous, those of the outer rows clavate 1.5 mm. long, those of the inner rows subulate 1 mm. long or less with a pair of large lobed glands as in σ . *Ovary* ovoid; style thick, curved; stigma peltate, 2—3-lobed. *Fruit* large, globose, slightly depressed, about 2.5—3 cm. in diam., when very young almost enclosed in the enlarged turbinate perianth-tube cupule, later on about one-third enclosed in a cup-shaped cupule, finally scarcely 5 mm. high being at the base surrounded by the margins of a saucer-shaped cupule 2.5 mm. in diam. at the mouth and 7—10 mm. high, somewhat rugose without; enlarged pedicel thick, flattened, 15 mm. long; pericarp thick, bright red when fresh and often spotted, shining and yellowish when dry.

PROVINCE WELLESLEY: at Sungie Dhanu, *Curtis* 2511!. PERAK: at Sungie Larut and Tupai, *Wray* 2337!, 2730!; *Scortechini* 265!, 270!, 589!; in various localities about Larut up to 900 m. alt., *King's Collector* 3697!, 6076!, 6124!, 6155!, 6237!, 6409!, 6567!, 6613!, 6689!, 6774!, 6866!, 2704!. SELANGOR: at Dusun Tua, *Ridley* 7621!. SINGAPORE: at Toas, *Ridley* 6455!.

45. *LITSEA SEBIFERA*, Blume Bijdr. 560 (1825). A small tree reaching a height of 20 m. and with a diameter of stem of 42 cm.; bark ashy grey; branchlets very stout, brown, with prominent leaf-scars

and elliptic lenticels, uppermost angular, minutely puberulous; innovations silvery-silky. *Leaves* coriaceous, alternate; lanceolate or ovate-oblong or oblong-lanceolate, acute or obtuse and mucronate at apex, rather abruptly cuneate, often unequally, at base; upper surface glabrous, lower paler, when young silky-tomentose and silvery; 15—50 cm. long, 5—12 cm. broad; midrib very broad (up to 4 mm.) immersed above, much raised beneath; main nerves 14—20 pairs, slender, obscure above, not prominent beneath, starting at about 60° with the midrib and curving to and along the margin; transverse nervules few, distant, very obscure as is the reticulation; petiole stout, rugose, 1—2 cm. long, channelled above. *Flowers* in tomentose umbellules in axillary or lateral tawny-pubescent racemes 3—10 cm. long, the peduncles 2—5 mm. long; raceme bracts rather large, boat-shaped, 6 mm. long, very early caducous; umbellules when expanded about 1 cm. broad; involucre bracts 4, orbicular, concave, silky-tomentose without, glabrous within; flowers in each umbellule 5—7, sessile; perianth-tube short, grey-villous within, lobes usually 6, sometimes more, ovate acuminate, ciliolate, 3 mm. long. *Stamens* of ♂ flowers 12—16, those of the outer rows 5 mm. long with subquadrate anthers and grey-villous filaments, sometimes with glands at the base, those of the inner rows much shorter and with a pair of rather large oblong obtuse subsessile glands at the base; all the anthers introrse or the lower slightly lateral; ovary ovoid, glabrous, with short style and peltate stigma, ovule apparently fertile. *Staminodes* of ♀ flowers not seen. *Fruit* depressed-globose, 2—3 cm. diam., half-immersed in the very rough leathery obconic enlarged perianth-tube, 10—15 mm. high and 25—30 mm. in diam. at the acute mouth; enlarged pedicel stout, flattened, 10—15 mm. long; pericarp smooth, fleshy within; testa membranous; cotyledons very fleshy, much depressed, hemispheric, about 1 cm. high to 2 cm. broad. Koord. & Val. Bijdr. X. 140; Greshoff Nutt. Ind. Pl. 9 t. 3. *Lepidadenia Wightiana*, Nees Syst. Laur. 583; Wight Ic. 1837; Miq. Fl. Ind. Bat. I. 1. 933; Hook. f. Fl. Br. Ind. V. 180. *Cylicodaphne sebifera*, Bl. Mus. Bot. Lugd.-Bat. I. 388; Meissn. in DC. Prodr. XV. 1. 202. *Tetranthera calophylla*, Miq. Pl. Jungh. I. 183; Zoll. Verz. 114. *T. Roxburghii*, Hassk. Pl. Jav. 213 excl. syn.

MALAY PENINSULA: *D. T. Gwynne-Vaughan*, 397! at Bukit besar, 200 feet. SINGAPORE: Balestier road, *Goodenough* in Herb. Sing., Vern. "Malah."—DISTRIB. Java (*Zollinger* 317!, *Junghuhn* 760!, 761!; *De Vriese*, *Lobb*, *Kurz*); Borneo (*Ridley* 12429!).

Ridley writes that this plant is not really wild in Singapore, but was probably introduced from Java and planted by Javanese. Even in Java it is apparently only cultivated. Blume calls it a large tree, but I prefer to follow the latest authors, Koorders and Valetton, who describe it as small. The fruit is said to give a useful wax. The locality 'Nilghiri Hills' has been omitted, for the reasons given in the Fl. Br. Ind. Koorders and Valetton call it hermaphrodite and certainly flowers of Junghuhn 760, otherwise ♂ seem to have fertile ovules. The only fruiting specimen I have seen is that of Goodenough in the Singapore Herbarium: it has not the thick cupule of Greshoff's picture which may perhaps be badly drawn. I cannot help thinking that both *L. Garciae*, Vidal Revis. Fl. Vasc. Philipp. 228 (1886), and *L. griseola*, Elmer in Leaf. Philipp. Bot. II. 378 (1908), may belong to *L. sebifera*, Bl.

46. *LITSEA MAINGAYI*, Hook. f. in Fl. Br. Ind. V. 175 (1886). A large evergreen tree reaching 24—36 m. in height and 60—90 cm. in diam. of stem; branchlets stout, glabrous, blackish when dry, uppermost angular; buds lanceolate, grey-puberulous, as in the inflorescence. *Leaves* rigidly coriaceous, alternate, oblong or oblanceolate, obtuse acute or sometimes long acuminate at apex, attenuate and often unequal at base; both surfaces glabrous, upper shining, bullate, reddish brown when dry, lower paler; margins recurved; 16—40 cm. long, 5—13 cm. broad; midrib stout, plane above, raised beneath; main nerves 10—18 pairs, irregular, impressed above, prominently raised beneath, starting at 50°—60° with the midrib, at first straight, then curved to near the margin where they are connected in prominent loops; transverse nervules irregular, impressed above, often branched, enclosing the netted reticulation; petiole long, slender, 4—7 cm. long, black, thick at the base. *Flowers* in tomentose umbellules on peduncles 5—7 mm. long, rather distantly scattered along the rhachises of slender axillary or lateral drooping racemes up to 16 cm. long; raceme bracts boat-shaped, about 6 mm. long, very caducous, grey-puberulous; involucre bracts 4—5, coriaceous, orbicular, concave, grey-puberulous without, glabrous within; umbellules when open (♂) 10—12 cm. in diam.; flowers in each umbellule 6; perianth-tube funnel-shaped, hoary-villous on both sides, lobes 6—8 also hoary-villous without, irregular in shape, obtuse acute or acuminate, 3 mm. long. *Stamens* of ♂ flowers 12 or more, those of the outer rows 3—4 mm. long with oblong usually apiculate anthers and slender glabrous filaments, those of the inner rows much shorter, the anthers subquadrate apiculate, the filaments furnished with a pair of large usually angular glands at the base; upper anther cells introrse, lower lateral; rudimentary ovary sunk in the perianth-tube or 0. *Staminodes* of ♀ flowers and *Fruit* not known.

PERAK : in dense jungle on hills at 150—300 m. alt. near Larut, King's Collector 4737 !. MALACCA : Maingay K.D. 1264 !, 1273 !.

47. *LITSEA NORONHÆ*, Blume Bijdr. 56 (1825). A small evergreen tree reaching 12 m. in height and 20 cm. in diam. of stem, more usually a stout shrub 3—5 m. high; branchlets stout, with pale brown smooth bark, the uppermost with the lanceolate buds and innovations silky-puberulous. *Leaves* subcoriaceous, alternate; elliptic-oblong or obovate, obtuse or shortly apiculate at apex, cuneate or attenuate at base; upper surface when dry olive brown, dull, glabrous, lower grey- or reddish-glaucous, minutely puberulous or glabrous; 20—45 cm. long, 8—17 cm. broad; midrib moderately stout, slightly impressed above, much raised beneath; main nerves 10—16 pairs, impressed above raised beneath, rather irregular, starting at about 60° with the midrib, at first nearly straight, then curved to and along the margin and then joined by a series of decreasing loops; transverse nervules irregular, distant, branched, enclosing the rather largely areolate reticulation; petiole stout, curved, 1—4 cm. long, channelled above. *Flowers* in tomentose umbellules on peduncles 5—15 mm. long or longer, usually distantly arranged along slender tawny-pubescent racemes 5—20 cm. long the ♀ shorter than the ♂; racemes axillary or lateral or on older branchlets in the axils of fallen leaves; raceme bracts ovate or nearly orbicular and caducous; involucre bracts 5, orbicular, concave, 3-nerved, ciliate or the inner fimbriate, glabrous within, recurved in flower; flowers in each umbellule 5—6; pedicels 2—3 mm. long in ♂, 0 in ♀; perianth-tube 0 or very short in ♂, 2 mm. long in ♀, lobes oblong, obtuse or acute, nearly glabrous, variable in number (5—7) and shape, 3—5 mm. long in ♂, 2 mm. in ♀. *Stamens* in ♂ flowers variable in number, from 9—12, normally 9, those of the outer rows long exsert, 6 mm. long with obovate anthers and slender villous filaments sometimes glandular at base, those of the inner rows shorter, with smaller anthers and a pair of large glabrous lobed glands at the bases of the filaments; rudimentary ovary 0, or if present very small with capitate stigma. *Staminodes* of ♀ flowers also variable in number and arrangement, 9—12, normally 9, those of the outer rows slenderly clavate 1.5—2 mm. long with villous filaments, those of the inner rows short, 6 mm. long, subulate with a pair of large lobed glands as in ♂, usually flattened. *Ovary* ovoid, style much curved, thick; stigma thick, peltate, deeply lobed. *Fruit* (unripe) small, rounded, laterally compressed, broader

than long, apiculate, seated on but not immersed in the spreading enlarged obconic or cup-shaped perianth-tube about 15—20 mm. in diam. at mouth; pedicel thickened; pericarp red when ripe. Koord. & Val. Bijdr. X. 176. *Cylicodaphne noronhiana*, Blume in Mus. Bot. Lugd.-Bat. I. 380; Meissn. in DC. Prodr. XV. 1. 202. *C. rubra*, Blume l.c.; Meissn. l. c. *Lepidadenia noronhiana*, Miq. Fl. Ind. Bat. I. 1. 934. *L. rubra*, Miq. l. c. *Tetranthera rubra*, Nees Syst. 564. *Myristica Hookeriana*, Wall. Cat. 6802 ?

PERAK: in Upper Perak, Ulu Tupai, etc., Wray 2688!, 3477!, 3552!, 4246!; at Goping, Chandenang, etc., up to 250 m. alt., King's Collector 1087!, 5688!, 6443!, 7495!; at L. W. Rest House, Scortechini 742!, 1901!; at Kwala Depang, Curtis 3181!, 3319!. SELANGOR: Batu caves woods, Ridley 8197!. SINGAPORE: Wallich 6802 B! ?—DISTRIB. Java, Sumatra.

Koorders and Valetton specially mention that they find only 4 involueral bracts, 5 subsessile flowers, 4 perianth-lobes and 6 stamens or staminodes. I cannot understand this as I have examined many flowers and find always the flowers of *Cylicodaphne* as I have described them. The number of stamens varies much and sometimes the perianth-lobes are partly converted into stamens, but I have rarely seen so few as 6 though this occurs sometimes as in Curtis 3319 and in the var. described below. I fail to see the connection with *Tetradenia* suggested by Koorders and Valetton.

Var. *hexandra*, Gamble. Leaves more coriaceous, very obtuse at apex, rounded at base; midrib very broad; main nerves up to 20 pairs. Flowers in umbellules on longer (15—20 mm.) peduncles; perianth-lobes 4, stamens usually only 6.

SELANGOR: at Ginting Biday, Ridley 7620!.

48. *LITSEA ROBUSTA*, Blume Bijdr. 560 (1825). A large spreading evergreen tree reaching 24—30 m. in height and a considerable diameter, up to 90 cm.; branchlets stout, pale brown when dry with smooth bark, the uppermost much darker, angular, minutely grey-puberulous as are the lanceolate leaf-buds; branch buds large globose with many orbicular tawny-puberulous bracts. Leaves submembranous, alternate; elliptic-oblong or -oblanceolate, acute or acuminate at apex, attenuate and finally often rounded at base; upper surface glossy green when fresh, olive brown when dry, glabrous, lower paler and very minutely grey-puberulous, finally glabrous; margins slightly recurved; 20—50 cm. long, 8—18 cm. broad; midrib stout, immersed above, much raised beneath;

main nerves 18—21 pairs, fairly regular and parallel, slightly impressed above, those of narrower leaves starting at 50°—60°, those of broader ones at 60° to even 80° with the midrib, only slightly curving till near the margin where they fade in small loops; secondary nerves between the main ones occasional; transverse nervules faint and usually branched, enclosing the very minute but obscure areolate reticulation; petiole stout, 3—4 cm. long, channelled above. *Flowers* in tomentose umbellules on short peduncles 5—7 mm. long in ♂, 4—5 in ♀, in slender racemes up to 18 cm. long in ♀, 6 cm. in ♂, from the axils of fallen leaves on the previous year's wood; rhachis angular, puberulous; raceme bracts ovate, very caducous; umbellules when open 10—12 mm. broad in ♂, slightly less in ♀; involucral bracts 4—6, the inner small, the outer orbicular, concave, rusty-grey puberulous without, at length reflexed; flowers in each umbellule 7; pedicels thick, short or 0, perianth tube thick, villous within, lobes 6, obovate, acute or obtuse, silky-villous without, glabrous within, 4—5 mm. long in ♂, less in ♀, lobes in ♀ early deciduous. *Stamens* in ♂ flowers 12, rarely more or less, those of the outer rows 5 mm. long with oblong anthers and slender slightly villous filaments sometimes monoglandular, those of inner rows shorter and with a pair of large flattened sessile lobed glands near the bases of the filaments; upper anther-cells introrse, lower lateral; rudimentary ovary ovoid, with short glabrous style and lateral stigma. *Staminodes* of ♀ flowers usually 12, in the central flowers up to 15, those of outer rows oblong spathulate, glabrous, gland-dotted, 2·5 mm. long; those of inner rows subulate, villous behind, also 2·5 mm. long, with a pair of flattened oblong sessile glands near the base. *Ovary* ovoid, glabrous; style thick, curved; stigma capitate, reflexed, silky. *Fruit* depressed-globose, greenish-white, 15 mm. high, 25 mm. in diam., seated on the enlarged pustulate rough perianth-tube, which when quite young is nearly completely closed, when half ripe hemispheric, finally saucer-shaped and more or less spreading, 10 mm. high, 27 mm. in diam., the edges sharp; enlarged pedicel thick, flattened, curved, 20 mm. long; pericarp shining, rugose when dry. Koord. & Val. Bijdr. X. 163. *Tetranthera robusta*, Nees Syst. Laur. 564. *Lepidadenia robusta*, Miq. Fl. Ind. Bat. I. i. 934. *Cylicodaphne robusta*, Blume Mus. Bot. Lugd.-Bat. II. 11.; Meissn. in DC. Prodr. XV. 1. 202. *Laurus grandis*, Wall. Cat. 2594 B. *Alseodaphne? costalis*, Nees in Wall. Pl. As. Rar. II. 72 and Syst. Laur. 185; Meissn. in DC. Prodr. XV. 1. 29; Hook. f. in Fl. Br. Ind. V. 146.

PERAK: in dense jungle on low hills at 90—150 m. elevation near Goping and Larut, *King's Collector* 5781!, 5878!, 6167!, 8266!.
 SELANGOR: at Gua Batu, *Ridley* 8529!. SINGAPORE: *Wallich* 2594b!.
 DISTRIB. Burma (*Griffith* 4326!).

49. *LITSEA SARAWACENSIS*, Gamble in Kew Bull. 365 (1910). A small tree (?); branchlets slender, pale brown, glabrous, uppermost and buds only minutely tawny-puberulous. *Leaves* chartaceous, opposite and subopposite; elliptic -or oblong-lanceolate, cuspidate-acuminate at apex, acute at base; upper surface reddish-brown when dry, smooth but scarcely shining, glabrous, lower paler, also glabrous; 8—14 cm. long, 2—4 cm. broad; midrib slender; main nerves 5—7 pairs, oblique, curved upwards to near the margin, and meeting in prominent arched loops, slightly impressed above; transverse nervules horizontal, irregular, obscure as is the reticulation; petiole 5—6 mm. long. *Flowers* in peduncled (2—5 mm., very slender) umbellules in short axillary or lateral racemes of about 5 and scarcely 4 mm. long; umbellules in bud 3 mm. broad, with 4 orbicular nearly glabrous concave involucral bracts about 2 mm. in diam.; flowers in each umbellule 5, sessile in bud; perianth-tube short, densely villous within, lobes 6, ovate, subacute, ciliate, 1.5 mm. long. *Stamens* of ♂ flowers (in bud only) 9, those of the 2 outer rows as long as the perianth-lobes and with slender slightly villous filaments, those of the inner row much shorter, with smaller anthers and with 2 large sessile glands near the base which is surrounded with villous hairs; rudimentary ovary very small or 0. *Staminodes* of ♀ flowers not seen. *Fruit* (immature) ovoid apiculate, seated on the obconic enlarged perianth-tube which is glabrous and smooth at the margins, the lobes deciduous; pericarp smooth, black when dry.

SINGAPORE: in reservoir woods, *Ridley* 4817!.—DISTRIB. Borneo, Sarawak, *Beccari* 905!, 1475!, 1708!, 1796!; near Kuching, *Haviland* 3077!, 3646!.

50. *LITSEA LANCIFOLIA*, Hook. f. in Fl. Br. Ind. V. 159 (1886). A bush or small tree reaching 12 m. in height and 20—30 cm. in diam. of stem; branchlets slender, pale greyish-brown, uppermost and innovations grey- or rusty-tomentose; buds lanceolate. *Leaves* membranous or chartaceous, opposite or subopposite or rarely alternate; oblong, elliptic-oblong or lanceolate, acuminate often abruptly and sometimes obtusely at apex, often mucronate, cuneate attenuate

or sometimes more or less rounded at base; upper surface dull, glabrous, lower glaucous or cinereous, rusty-tomentose when young; 7—20 cm. long, 2—6 cm. broad; midrib slender, tomentose beneath, slightly channelled above; main nerves 8 to 12 pairs, curving rather obliquely upwards to and along the margin; transverse nervules faint and irregular as is the reticulation; petiole tomentose, short, 3—7 mm. long. *Flowers* yellowish, in peduncled (up to 5 mm.) umbellules in short axillary or lateral bracteate rusty-pubescent racemes of about 5 together; umbellules about 6 mm. broad with 4 orbicular concave involucre bracts 2—3 mm. in diam., spreading in flower; flowers in each umbellule 3, very small and very shortly pedicelled; perianth-tube very short both in ♂ and ♀ and densely long-villous within at mouth, lobes 6, ovate-oblong, acute, 3 mm. long, those of ♀ smaller. *Stamens* of ♂ flowers 9, those of the outer 2 rows eglandular with small quadrate anthers and slender villous filaments 3 mm. long; those of 3 inner shorter (2 mm.) and with a pair of large rounded sessile glands at the base; rudimentary ovary ovoid with short style and 2-lobed stigma. *Staminodes* of ♀ flowers also 9, those of 2 outer rows spatulate 1 mm. long, those of the inner row short conical with 2 large rounded sessile glands and tufts of long hairs. *Ovary* ovoid, glabrous; style rather thick, bent; stigma large, peltate, lobed, all together 2—3 mm. long. *Fruit* ellipsoid, apiculate, 10 mm. long, 5 mm. in diam., seated on the slightly enlarged (4 mm. in diam., 2 mm. high) but not hardened perianth-tube which is more or less crowned with the remains of the perianth-lobes and staminodes; pericarp smooth; pedicels thickened and elongated to 3—4 mm. Prain Beng. Plants 902. *Tetranthera lancifolia*, Roxb. ex Wall. Cat. 2532; Nees in Wall. Pl. As. Rar. II. 65 and Syst. Laur. 509; Meissn. in DC. Prodr. XV. 1. 194; Miq. Fl. Ind. Bat. I. 944; Kurz For. Fl. II. 300. *T. chrysantha* and *T. pusilla*, Bl. Mus. Bot. Lugd.-Bat. I. 376. *T. attenuata*, Wall. Cat. 2534 in part.

PERAK: at Relan Tujur, Tapu and other places, Wray 996!, 1306!, 2610!, 2895!, 3438!; *King's Collector* 2963!, 3233!, 3254!, 3351!, 6609!, 10526!, 10533!. SELANGOR: at Kwala Lumpur, *Curtis* 2401!. JOHORE: at Jaffaria, *G. King*!. SINGAPORE: at Selitar, *Ridley* 6454!; at Bukit Payang, *Ridley* 12563!.—DISTRIB. India (E. Himalaya, Assam, Khasia Hills and Sylhet), Burma, Sumatra, Borneo.

Var. *rufa*, Gamble. *Leaves* smaller, narrower, more tomentose; fruit nearly globose.

PERAK: *King's Collector* 7789!, 8807!, 10113!.

In my opinion this variety hardly differs from *L. fulva*, Boerl. = *Tetranthera fulva*, Blume.

51. *LITSEA GRACILIPES*, Hook. f. in Fl. Br. Ind. V. 159 (1886). A small evergreen tree reaching a height of 15 to 20 m. and 40—50 cm. in diam. of stem; branchlets slender, grey, uppermost nearly black, glabrous or minutely puberulous; leaf-buds lanceolate, grey-puberulous. *Leaves* pergamaceous, opposite or subopposite; elliptic or elliptic-oblong or -oblanceolate, acute or shortly acuminate at apex, sometimes mucronate, cuneate at base or sometimes almost rounded; upper surface pale olive-brown, glabrous, lower grey, glabrous or when young slightly puberulous especially along the nerves; 10—16 cm. long, 3—6 cm. broad; midrib slender, slightly impressed above; main nerves 6—8 pairs, faint, distant, leaving the midrib at about 60° and curved to and along the margin; transverse nervules few, obscure as is the reticulation; petiole thick, 8—15 mm. long, black. *Flowers* in umbellules on slender puberulous pedicels up to 15 mm. long, in axillary or lateral very short (5 mm.) racemes of about 1—10: involucral bracts 4, orbicular, concave, rusty-puberulous without, glabrous within, the margins ciliate or the inner fimbriate, reflexed in flower; umbellules in ♂ 8 mm. in diam. in flower, in ♀ 5 mm.; flowers in each umbellule 3—4 on short pedicels; perianth-lobes 6, densely silky villous without, ovate-acute or oblong-obtuse, 2-3 mm. long in ♂, 2 mm. in ♀, gland-dotted. *Stamens* of ♂ flowers 9—12, normally 12, those of the outer rows long exsert, 5 mm. long with oblong anthers and slender slightly villous filaments, those of inner rows shorter and with a pair of reniform stipitate glands from the bases of the filaments; rudimentary ovary 0 or very small, conical, glabrous. *Staminodes* of ♀ flowers 12, those of the outer rows clavate-spathulate 1—1.5 mm. long, those of the inner rows clavate with a pair of large glands at the base. *Ovary* ovoid; style thick, curved; stigma peltate 2—3-lobed. *Fruit* cylindric-oblong, obtuse at apex, 15—17 mm. long, 6—7 mm. in diam., seated on the obconic enlarged perianth 7 mm. long with pedicel and 7 mm. in diam. at mouth; pericarp glossy green spotted with white (Kunstler), yellowish and smooth when dry; testa crustaceous; cotyledons semi-cylindric.

PERAK: at Thaipeng, *Wray* 2101!; on low ground near Larut, *King's Collector*, 5421!. 5455!. MALACCA: *Griffith* K.D. 4311!.

JOHORE: at Tanjong Kupang, *Ridley* 6457!.—DISTRIB. Borneo (*Haviland* 3327!, *Kurz*! 3329!).

52. *LITSEA UJONGENSIS*, Gamble in Kew Bull. 366 (1910). An evergreen shrub or small tree reaching 6 to 9 m. in height; branchlets rather slender, densely rusty-tomentose. *Leaves* membranous to chartaceous, opposite or subopposite; oblanceolate, rather abruptly cuspidate acuminate at apex, cuneate or attenuate at base which is slightly rounded; upper surface shining, glabrous except the tomentose midrib and nerves, lower surface rusty-tomentose on the nerves and nervules, minutely grey-pubescent between them; 12—22 cm. long, 5—7 cm. broad; midrib slightly raised above, more so beneath; main nerves 10—15 pairs, slender, curving upwards to near the margin; transverse nervules irregular, obscure, as is the reticulation; petiole rather stout, short, rusty-tomentose. 5—8 mm. long. *Flowers* in nearly sessile umbellules in very short 2—3-flowered axillary fascicles; perianth-lobes in ♀ about 1 mm. long villous outside prominently gland-dotted, more or less persistent in fruit as are the linear glabrous staminodes, the outer ones 1.5 mm. long, the inner three 1 mm. long with a pair of large glands at their base; ♂ flowers unknown. *Fruit* ellipsoid, 10 mm. long 8 mm. in diameter, seated on the disciform enlarged perianth-tube 4—5 mm. in diam. and 3—4 mm. high including the enlarged villous pedicel; style and stigma more or less persistent; pericarp crustaceous, black when dry.

NEGRI SEMBILAN: Sungei Ujong, *Ridley's Collectors* 1904!, 1942!, 2305!, 2316!, 5846!. MALACCA: at Gunong Sedang, etc., *Ridley*, 3172!, 5848!; all in Herb. Singap.

Var. *nervosa*, Gamble. *Leaves* subsessile, thickly pubescent, especially on the nerves, rounded at base; the nerves, transverse nervules and reticulation prominent. *Ovary* ovoid with long style and peltate 2-lobed stigma.

PEARK: at Gunong Batu Pateh, lower camp, *Wray* 1129!; *Scortechini* 2097!

53. *LITSEA SESSILIFLORA*, Hook. f. in Fl. Br. Ind. V. 160 (1886). A small tree; branchlets as thick as a goose-quill, the uppermost subquadrangular densely rusty-tomentose; buds ovoid, short. *Leaves* chartaceous, opposite, more or less bifarious; oblong-oblanceolate, obtuse at apex with a short acuminate point, cuneate or attenuate

at base; glabrous above, except the midrib which is slightly raised and tomentose, other nerves being deeply sunk, rusty-pubescent beneath; 15—30 cm. long, 4—10 cm. broad; midrib slender on upper, stout on lower, surface where very prominent; main nerves 16—20 pairs, impressed above, very prominently raised beneath, straight or not at first then curved to meet (all but the lowest) in prominent marginal loops; secondary nerves few, transverse nervules distant but prominent, as is also the reticulation; petiole very stout, tomentose, 5—15 mm. long. *Flowers* in densely tawny-pubescent umbellules sessile in the axils of the leaves or of fallen leaves, solitary or crowded, 6 mm. in diam. in ♂, ♀ smaller; involucre bracts 4, orbicular, concave, 4 mm. in diam. (♂), smaller in ♀; perianth-tube funnel-shaped, 2—3 mm. long; perianth-lobes 6, ovate, obtuse, broader in the ♂ than in the ♀. *Stamens* of ♂ flowers 9; those of the outer 2 rows eglandular, 2.5 mm. long, with elliptic obtuse anthers and slender villous filaments; those of the inner row shorter, 1.5 mm., with a pair of large nearly or quite sessile glands at the bases of the filaments; rudimentary ovary ovoid with thick style and small bifid stigma. *Staminodes* of ♀ flowers also 9; those of the 2 outer rows clavate villous 1.25 mm. long; those of the inner row spatulate, 1 mm. long, with a pair of large glabrous subsessile glands at the base. *Ovary* ovoid, glabrous; style thick, curved at top; stigma peltate, bifid. *Fruit* (young only) ovoid, at least 7 mm. long, apiculate, seated on the funnel-shaped enlarged perianth-tube which is 5 mm. broad at the mouth and carries the remains of the perianth-lobes and staminodes; pericarp thin, smooth.

PENANG: on Government Hill, *Maingay* K.D. 1511! and *Ridley* 7917!; in Moniot's road, *Curtis* 649!. JOHORE: at Gunong Taning, *Lake and Kelsall* 4085!.—DISTRIB. Sumatra; Borneo (*Beccari* 1545).

Beccari's specimens from Borneo have the leaves smaller and not so prominently marked by sunk nerves as the others, and they are more pubescent beneath, but the flowers (♀) agree. In *Maingay's* specimens the sunk nerves and nervules make a close imitation of the well-known 'crocodile skin' pattern.

54. *LITSEA FERRUGINEA*, Blume Bijdr. 561. (1825). A large tree reaching more than 30 m. in height and a considerable girth (9 m. diam.—*King's Collector*); upper branchlets thick, striate, angular, densely dark ferruginous-tomentose; buds ovoid with densely tomentose scales. *Leaves* coriaceous, alternate or sometimes subopposite, obovate or obovate-oblong, acute and mucronate at apex, cuneately

attenuate at base; upper surface shining, glabrous except the midrib, lower minutely dark ferruginous-tomentose, more so on the nerves; margins recurved; 10—18 cm. long, 4—7 cm. broad; midrib stout, impressed above, prominently raised beneath; main nerves 10—13 pairs, parallel, at about 40° with the midrib, curved in the upper part to and along the margin, impressed above, prominently raised beneath; transverse nervules sub-horizontal, obscure as is the reticulation; petiole stout, 10—15 mm. long. *Flowers* yellowish, without densely dark-tawny-tomentose, in peduncled (5—10 mm.) umbellules in short lateral racemes of about 5 and up to 5 mm. long; umbellules 7 mm. in diam., (♂) with 4 orbicular concave involucre bracts glabrous within; flowers in each umbellule about 7 very shortly pedicelled; perianth-tube short, lobes ovate-oblong, ciliate, 3-nerved, glandular, 3 mm. long. *Stamens* in ♂ flowers 12 in 4 rows, nearly or quite glabrous; those of the 2 outer rows with subquadrate anthers and slender filaments, 1.5 mm. long, eglandular; those of 2 inner rows similar but smaller and only 1 mm. long with a pair of oblong sessile glands near the tops of the very short filaments; rudimentary ovary ovoid with thick style and short stigma. *Staminodes* in ♀ flowers also 12, glabrous, those of the outer rows spatulate, 1.25 mm. long; those of the inner rows 1 mm. long, subulate, with a pair of glands near the tops of the filaments. *Ovary* not seen. *Fruit* depressed-globose, 16 mm. in diam., 12 mm. long, when young nearly quite surrounded by the rugose cupule formed by the enlarged perianth-tube which opens out gradually and at length becomes a shallow rather thin patelliform cup under 5 mm. high and 1—2 cm. broad at mouth; pedicel obconic, rough, 5 mm. long; pericarp smooth, yellowish when dry. Koord. & Val. Bijdr. X. 179. *Cryptocarya ferruginea*, Bl. Cat. Hort. Bog. 65. *Tetranthera Blumei*, Nees in Wall. Pl. As. Rar. II. 65. *Actinodaphne Blumei*, Nees Syst. Laur. 598. *Lepidadenia ferruginea*, Miq. Fl. Ind. Bat. I. 1. 935. *Cylindrodaphne ferruginea*, Meissn. in DC. Prodr. XV. I. 207.

PERAK: Hills near Larut at 150—250 m. alt., etc., *King's Collector* 6039!, 6826!, 7546!, 8437!. SINGAPORE: at Selitar, *Ridley* 6151!.—DISTRIB. Java.

55. *LITSEA GRIFFITHII*, Gamble. An evergreen tree reaching 20 m. in height and 30—45 cm. in diam. of stem; branchlets stout, greyish-brown, somewhat angular, uppermost and innovations densely dark rusty-tomentose; buds leafy, with few deciduous scales. *Leaves* coriaceous, opposite or subopposite or rarely alternate; oblong

or elliptic-oblong, obtuse or obtusely acute at apex, cuneate or attenuate to almost rounded at base; upper surface shining, yellowish green, glabrous except on the midrib, minutely reticulate, lower surface densely light rusty-tomentose; margins recurved; 10—30 cm. long, 3—9 cm. broad; midrib flat or slightly impressed above, prominent beneath; main nerves 8—15 pairs, regular and regularly curved upwards to and along the margin, the uppermost joining in loops, faint and slightly impressed on the upper surface, densely tomentose and very prominent on the lower; transverse nervules arched; reticulation minutely areolate; petiole stout, 1—2.5 cm. long. *Flowers* yellowish or white, densely dark-tawny tomentose without, in peduncled (1—2 cm.) umbellules in short stout axillary or lateral racemes of about 5 and about 1 cm. long; umbellules 8—10 mm. in diam. (♂), 7 mm. broad (♀), with 4 orbicular or ovate concave involucre bracts, 5 mm. in diam. glabrous within; flowers in each umbellule 6—8, usually 7, very shortly pedicelled; perianth-tube funnel-shaped, 1.5 to 2 mm. long, lobes oblong ciliate, nearly glabrous within, 1—3-nerved, 4 mm. long in ♂, 2 mm. in ♀, 1.5 mm. or .5 mm. broad. *Stamens* in ♂ flowers 12, in 4 rows; those of the outer two rows with short quadrate anthers 1.5 mm. long, the filaments 4—5 mm. long, villous; those of the inner rows shorter, the anthers 1 mm. long, the filaments 2 mm. long, furnished above the base with a pair of large oblong truncate sessile glands; upper anther cells all introrse, lower all lateral; rudimentary ovary ovoid with thick straight style 2 mm. long and a bilobed papillose stigma. *Staminodes* of ♀ flowers 12, in 4 rows; those of the outer 2 rows spatulate, 1.5 mm. long; those of the inner two rows club-shaped, 1 mm. long, with a pair of large sessile glands attached above the base. *Ovary* ovoid; style very thick and fleshy, 3 mm. long; stigma peltate, 3—4-lobed and crenulate, the margins reflexed. *Fruit* ovoid, 2—2.5 cm. long and 13 mm. in diam., apiculate, half immersed in the hemispheric cup-shaped enlarged perianth-tube which is about 17 mm. high and as much in the diam. of the truncate sharply-edged mouth, prominently warted and very shortly pedicelled; pericarp smooth, wrinkled when dry. *L. Blumii*, Hook. f. in Fl. Br. Ind. V. 160, *non* Nees.

PERAK: at Changkat Jerin, Wray 2757!; at Ulu Bubong and near Larut at 90—180 m. alt., King's Collector 5865!, 8573!, 10167!. SELANGOR: in Weld's Hill Reserve, A. Burn-Murdoch 282 (Ridley 14284)!. MALACCA: Griffith K.D. 4285!; Maingay K.D. 1252!.

JOHORE: at Jaffaria, *G. King!*, *Hullett!*. SINGAPORE: Reservoir woods and garden jungle, *Ridley* 5823!, 5569!.—DISTRIB. Sumatra, in Lampongs, *H.O. Forbes* 1762!.

This is the plant described in *Fl. Br. Ind.* as *Litsea Blumii*, Nees, and identified from the Java specimens in *Herb. Kew.* Koorders and Valetton have, however, pointed out that *L. Blumii*, Nees = *L. ferruginea*, Blume, is a different plant and after examining many specimens I fully agree in their opinion, so that a new name has to be found for this species.

14. NEOLITSEA, Merr.

Evergreen trees. *Leaves* alternate, opposite, subopposite or verticillate, triple-nerved, usually areolate-reticulate, more or less lanceolate; buds perulate. *Flowers* dioecious, in sessile umbellules, in clusters or short racemes in the axils of upper leaves, or on the branchlets between the nodes, the clusters with small bracts at their bases; involucre bracts 4, deciduous; flowers in each umbellule 3—7, pedicels elongating; perianth-lobes 4. *Stamens* in ♂ flowers 6; those of the two outer rows eglandular, the 2 inner biglandular, anther-cells all introrse or the lower lateral. *Staminodes* of ♀ flowers 6, arranged as the stamens, usually linear or linear-clavate. *Ovary* ovoid, style thick; stigma usually peltate, in ♂ flowers 0 or rudimentary. *Fruit* a globose berry seated on the slightly enlarged disciform perianth-tube and somewhat elongate pedicel; pericarp smooth; cotyledons hemispheric.—DISTRIB. India and Malaya, one species or more extending to the Philippines and Australia: species about 30.

- | | |
|--|---------------------------|
| Leaves alternate | 1. <i>N. zeylanica</i> . |
| Leaves opposite subopposite or verticillate | |
| Leaves glaucous beneath, softly villous on the nerves and petioles and also on the upper branchlets and inflorescence | 2. <i>N. villosa</i> . |
| Leaves densely and softly rusty-villous on the under surface, on the nerves of the upper surface, on the branchlets and inflorescence .. | 3. <i>N. mollissima</i> . |
| Leaves glabrous except when young, very prominently areolate-reticulate | 4. <i>N. Kedahensis</i> . |

1. NEOLITSEA ZEYLANICA, Merrill in Philipp. Journ. Sc. I. Suppl. 57 (1906). An evergreen tree of variable character of foliage, flowers and fruit; branchlets slender, glabrous, greyish-brown, the uppermost sometimes minutely pubescent; innovations

golden-tawny-pubescent. *Leaves* coriaceous or subcoriaceous, alternate; elliptic or elliptic-ovate or -lanceolate, acuminate often abruptly at apex with obtuse points, acute or rounded at base; glabrous on both surfaces except sometimes when very young, the lower surface glaucous or not; margin usually recurved; 6—14 cm. long, 3—6 cm. broad; midrib slender, raised on both surfaces, side ribs from about 5—8 mm. above the base, curving upwards to disappear halfway up or a little higher; main nerves irregular, 2—5 pairs, obscure as are the arched transverse nervules; reticulation areolate, sometimes prominently, more usually only under the lens; petiole slender, 1—2 cm. long, curved. *Flowers* in sessile umbellules, in short axillary or lateral (on internodes of upper branchlets) fascicles or racemes up to 10 mm. in length, the raceme bracts orbicular, ciliate; umbellule buds globose, minutely tawny-puberulous or glabrescent, 3—5 mm. in diam.; involucre bracts 4, the 2 outer orbicular, concave, the 2 inner more or less obovate; flowers in each umbellule 3 to 5 or even to 7, on silky-villous pedicels finally reaching 5 mm. long in ♂, or 1.5 mm. in ♀; perianth lobes oblong, obtuse or acute, gland-dotted, sparsely villous outside, about 3 mm. long. *Stamens* in ♂ flowers 6, exsert; those of the outer rows with small subquadrate anthers and slender filaments which are glabrous or slightly villous, 4—5 mm. long; those of the inner row similar but shorter, and with a pair of large reniform emarginate stipitate glands about half-way up the filaments (at base in bud!); rudimentary ovary 0 or very small with slender style. *Staminodes* of ♀ flowers also 6; those of the outer rows linear villous, 2 mm. long; those of the inner row linear-clavate, 1.5 mm. long, with a pair of large reniform or cordate glands at their bases. *Ovary* ovoid, glabrous; style stout, twisted; stigma large, lateral. *Fruit* globose, 8 to 15 mm. in diam., seated on the disciform enlarged perianth tube, the disk 4 mm. in diam., crenate on the margins, the lobes quite deciduous; enlarged pedicel clavate, 5—7 mm. long; pericarp smooth, shining; cotyledons hemispheric. *Tetradenia zeylanica*, Nees in Wall. Pl. As. Rar. II. 64 and III. 30. *T. foliosa*, Nees and *T. furfuracea*, Nees l.c. *Tetranthera foliosa*, *pulcherrima* (in part) and *furfuracea*, Wall. Cat. 2563, 2567, 2568. *Litsea zeylanica*, C. and Fr. Nees in Amæn. Bot. Bonn. Fasc. I. 58 (1823) t. 5; Nees Syst. Laur. 626; Meissn. in DC. Prodr. XV. 1. 226; Blume Mus. Bot. Lugd.-Bat. I. 346, Wight Ic. tt. 132, 1844; Bedd. Fl. Sylv. t. 294; Dalz. and Gibs. Bomb. Fl. 223; Brandis For. Fl. 382 and Ind. Trees 540; Hook. f. Fl. Br. Ind. V. 178; Trimen Fl. Ceyl. III. 454; Benth. & von Muell. Fl. Austral.

V. 307; Cooke Bomb. Fl. II. 540; Prain Beng. Plants 902. *L. oblonga*, Nees Syst. Laur. 678; Wight Ic. t. 1845. *L. striolata*, Blume l.c. 347; Meissn. l.c. 223. *L. foliosa*, Nees l.c. 622; Blume l.c. 346; Meissn. l.c. 222 (excl. var. β .); Kurz For. Fl. II. 306. *L. furfuracea*, Nees l.c. 625; Blume l.c. 347; Miq. Fl. Ind. Bat. I. 975. *L. scrobiculata*, Meissn. l.c. 223. *L. trinervia*, Juss. in Dict. Sc. Nat. XXVII. 79. *Laurus Cassia*, Linn. ex Wight in Hook. Journ. Bot. II. (1840) 336. *L. involucrata*, Vahl in Herb. Juss. ex Lamk. Dict. III. 445; Roxb. Cor. Pl. II. 46, t. 187.

PENANG: Wallich 2568 b!; Curtis 443!, 468!; at Batu Feringgi, Ridley!. PROVINCE WELLESLEY: at Bukit Turu, Ridley 6956!. PERAK: *Scortechini* 1085!. MALACCA: on Mount Ophir, etc., Griffith 4331!; Maingay K.D., 1255!; at Brisu, Holmberg 759!. PAHANG: at Praman and Kwala Pahang, Ridley! (c.f. also Ridley in Trans. Linn. Soc. 2nd Ser. III. 341). SINGAPORE: Wallich 2568a!; at Changi, Pulau Ilbin and Bedoh, Ridley 3604a!, 4811!, 4819!, 8406!.—DISTRIB. India (in most hilly regions), Burma (Martaban Hills), Ceylon, Borneo (Mount Kinabalu at 2500 m., Haviland 1128! c.f. Stapf in Trans. Linn. Soc. 2nd Ser. IV. 220), Philippines Queensland.

2. *NEOLITSEA VILLOSA*, Gamble. An evergreen tree reaching 12—18 m. in height and 35—50 cm. in diam. of stem; branchlets moderately stout, grey, the uppermost densely grey-tawny puberulous; branch buds ovate, perulate, rusty puberulous, the scales obtuse; leaf-buds in ♀ trees smaller. Leaves coriaceous, opposite subopposite or subverticillate, the verticils usually of 5; lanceolate or oblong-lanceolate, long and sharply acuminate at apex, acuminate at base; upper surface glabrous, shining, olive-brown when dry, minutely areolate-reticulate, lower bluish-green when fresh, glaucous when dry, glabrous except the ribs and nerves which are softly rusty-villous; margins slightly undulate, recurved; 10—15 cm. long, 3—5 cm. broad; midrib rather slender, impressed above and keeled, raised beneath; side ribs from about 7 mm. above the base, oblique, impressed above, reaching to about half-way up and then ending in diminishing small loops which connect them with the lowest pair of nerves; nervules outside them 10 or more, looped; main nerves 3—5 pairs, prominent, sometimes branched, impressed above, oblique, joined by loops near the margin; transverse nervules many, arched, fairly prominent enclosing the areolate reticulation; petiole rather slender, twisted, pubescent, 10—12 mm. long, the upper part bordered by the decurrent margins of the blade. Flowers

in sessile umbellules in clusters of usually 4 to 6 on the upper branchlets between the nodes; umbellule buds globose, 5—6 mm. in diameter, closely grey-tawny pubescent; involucral bracts 4, orbicular, concave; flowers in each umbellule 4—5 (buds of ♂ only); perianth-lobes 4, oblong, densely silky-villous without, glabrous within. *Stamens* of ♂ flowers 6, the 4 of the outer rows with oblong anthers and slender filaments villous only at the base, the 2 of the inner row similar with a pair of large orbicular stipitate glands at the base; rudimentary (?) ovary ovoid; style curved; stigma capitate. *Staminodes* of ♀ flowers linear clavate. *Fruit* globose, 10 mm. in diam., seated on the flattened subquadrangular enlarged perianth-tube, villous within, 3 mm. in diam.; enlarged pedicel stout, 4—5 mm. long; pericarp bright red, wrinkled when dry. *Litsea villosa*, Blume Mus. Bot. Lugd.-Bat. i. 349; Meissn. in DC. Prodr. XV. 1. 221.

PERAK: in dense forest on tops of high mountains in Larut at 1200—1400 m. alt., *King's Collector* 6979!, 7011!.—DISTRIB. Amboina, Philippine Islands.

3. *NEOLITSEA MOLLISSIMA*, Gamble in Kew Bull. 366 (1910) and 172 (1911). A small evergreen tree; branchlets moderately stout, rounded, grey, the uppermost softly and closely rusty-villous; leaf-buds ovate, perulate, densely villous. *Leaves* coriaceous, opposite subopposite or subverticillate, the verticils usually of 3; lanceolate, long acuminate at apex, acute at base; upper surface shining, olive-brown when dry, glabrous except the rusty-villous midrib; lower surface densely and softly rusty-villous, the nerves especially, greyish between the nerves; margins slightly recurved; 9—12 cm. long, 2.5—3.5 cm. broad; midrib stout, raised on the upper surface; side pair of ribs starting from about 5 mm. above the base and ending half-way up or a little further; main nerves 3—4 pairs, the pairs subopposite, very oblique, slightly impressed above, raised beneath; transverse nervules many, arched, obscure, enclosing the regular minutely areolate reticulation visible only with the lens; petiole stout, rusty-villous, 6—8 mm. long. *Flowers* in densely rusty-villous sessile umbellules, 1—3 together, axillary or on the branchlets between the upper nodes; involucral bracts very caducous; flowers in each umbellule apparently 5 (♀ only) on very short villous pedicels; perianth-tube densely long silky-villous within as are the 4 lanceolate perianthlobes. *Staminodes* of ♀ flowers 6; those of the two outer rows linear-clavate, 1.5—2 mm. long, sparsely villous, the inner pair

similar but shorter and with a pair of rather large cordate stipitate glands at their bases. *Ovary* ovoid; style densely villous; stigma capitate. *Stamens* of ♂ flowers and *fruit* not seen.

PERAK: at lower camp Gunong Batu Pateh at 1000 m. alt., Wray 931!

4. *NEOLITSEA KEDAHENSIS*, Gamble in Kew Bull. 367 (1910) and 172 (1911). An evergreen tree; branchlets slender, terete, uppermost in verticils, densely rusty-villous as are the leaf-buds. *Leaves* coriaceous, verticillate, prominently areolately pitted; elliptic-lanceolate, cuspidate-acuminate at apex, narrowed at base; upper surface glabrous except when young and then rusty-villous on the ribs and nerves, lower surface strigosely villous when young especially on the ribs and nerves and margin, afterwards glabrous; margin cartilaginous, recurved; 6–11 cm. long, 2–3.5 cm. broad; midrib slender, raised on both surfaces; side ribs slender, raised, starting at about 6 mm. above the base, ending a little above half-way in lessening slender loops which join the lower main nerves; main nerves 3–5 pairs, slender, curving obliquely to near the margin and there joining in slender loops; transverse nervules many, obscure, arched, enclosing the deeply pitted reticulation; petiole slender, 5–6 mm. long, pubescent when young. *Flowers* in sessile umbellules in dense axillary or lateral clusters supported by short obtuse bracts; involucre bracts 4, orbicular, concave, ciliate or fimbriate on the margins, 5–7-nerved, densely rusty-tomentose without, glabrous within; flowers in each umbellule 5, on short long-villous peduncles; perianth-lobes 4 (♂ only) ovate, obtuse or acuminate, densely villous, 1.5–2 mm. long. *Stamens* in ♂ flowers 6, the 4 outer with oblong anthers and slender glabrous filaments, the 2 inner shorter and with a pair of reniform stipitate glands at the bases of the filaments; rudimentary ovary ovoid, sparsely villous; style slender; stigma capitate. *Staminodes* of ♀ flowers and *fruit* unknown.

KEDAH: on Kedah Peak at 900 m. alt., Ridley 3590!, 5940!

Tribe VII. LAURÆÆ.

15. *LINDERA*, Thunb.

Shrubs or trees, often deciduous; *buds* naked or perulate. *Leaves* alternate or subopposite, penni-veined or 3–5-ribbed, chartaceous or coriaceous. *Flowers* dioecious, in pedunculate or sessile umbel-

lules, axillary or lateral on the branchlets; involucre bracts 2 to 4, concave, usually hemispheric; flowers in each umbellule 1 to 6 or more; pedicels long or short; perianth-tube very short, lobes 6 or more, usually unequal. *Stamens* in ♂ flowers normally 9 or 12, in three or four rows; those of the outer rows eglandular; those of the inner rows biglandular; anthers all introrse, 2- (or rarely 4-) celled, filaments usually slender; ovary 0 or rudimentary with rudimentary style and usually peltate stigma. *Staminodes* of ♀ flowers normally 9 or 12, also in three or four rows; those of the outer rows clavate eglandular; those of the inner rows clavate or subulate biglandular. *Ovary* ovoid; style usually thick; stigma peltate. *Fruit* globose or ovoid, seated on the usually slightly enlarged perianth-tube with usually persistent lobes; pedicel often thickened; pericarp succulent. *Seed* 1; testa thin, cotyledons conform to seed, usually hemispheric. —**DISTRIB.** About 60 species in tropical and Eastern Asia to Japan and in North America.

Leaves 1-ribbed, penninerved; flowers in each umbellule more than 9.

Leaves subcoriaceous, ovate, short-acuminate, upper surface olive-green when dry 1. *L. malaccensis*.

Leaves chartaceous, obovate, long-acuminate, upper surface blackish when dry 2. *L. Wrayi*.

Leaves subcoriaceous, lanceolate, acuminate; main nerves about 12 pairs 3. *L. oxyphylla*.

Leaves chartaceous, lanceolate, acuminate; main nerves 7—8 pairs 4. *L. polyantha*.

Leaves membranous, oblong-lanceolate, greyish; main nerves about 8—12 pairs 5. *L. pipericarpa*.

Leaves 3-ribbed, more or less penninerved on midrib; flowers in each umbellule 1—3.

Leaves chartaceous, over 6 cm. long.

Leaves long caudate-acuminate at apex; main nerves from midrib 1—3 pairs; flowers in each umbellule usually 1; perianth-lobes obtuse 6. *L. bibracteata*.

Leaves rarely caudate, usually acuminate at apex; main nerves from midrib 2—5 pairs; flowers in each umbellule 3; perianth-lobes acuminate 7. *L. casia*.

Leaves coriaceous, usually under 6 cm. long; perianth-lobes obtuse 8. *L. rufo*.

1. *LINDERA MALACCENSIS*, Hook. f. in Fl. Br. Ind. V. 183 (1886). A tree reaching 15 to 25 m. in height and 40 to 60 cm. in

diam. of stem; branchlets dark brown to black, smooth, uppermost and lanceolate leaf-buds ferruginous-silky. *Leaves* subcoriaceous, alternate, glabrous or slightly puberulous, especially on the nerves, beneath; broadly ovate or elliptic-ovate, acuminate and often cuspidate at apex, rounded or sometimes acute at base; upper surface shining, olive-green when dry, lower dark reddish-brown; 7—17 cm. long, 4—9 cm. broad; midrib slender, raised on both surfaces; main nerves 5—7 pairs, slightly impressed above, the lowest 1—2 pairs from near the base, the rest more distant, all curving gradually and joining in loops a little distance from the margin; transverse nervules distant, irregular, the reticulation obscure; petiole slender, 1—2 cm. long, channelled above and near the top bordered by the decurrent margins of the blade. *Flowers* in pedunculate sparsely villous umbellules clustered in stout racemes in the axils of the leaves; racemes 1—6 mm. long; peduncles slender 8—15 mm. long, ♀ somewhat shorter than ♂; involucre bracts 4, the outer pair hemispheric, early deciduous; flowers in each umbellule 9 or more; pedicels slender, 1—3 mm. long; perianth-lobes 6, in ♂ obovate lobed, in ♀ oblong or spatulate, gland-dotted, 1—1.5 mm. long. *Stamens* of ♂ flowers 9, very small; those of 1st and 2nd rows glandular with glabrous filaments; those of 3rd row bearing a pair of rather large glands a little above the bases of the filaments; rudimentary ovary 0 or very small, conoidal. *Staminodes* of ♀ flowers also 9; those of rows I and II linear clavate; those of row III clavate with large glands as in ♂. *Ovary* ovoid, glabrous; style thick, curved; stigma peltate, lobed. *Fruit* a globose or ovoid drupe 6—20 mm. long, 6—15 mm. in diameter; pericarp smooth; fruiting pedicels thickened, 3—10 mm. long, surmounted by the scarcely enlarged perianth; fruiting peduncle also thickened, 15—20 mm. long.

PERAK: at Relan Tujor, Wray 3133!; *Scortechini*!; about Goping and Larut, King's Collector 873!, 963!, 2533!, 5139!, 5167!, 5578!, 5679!, 8839!. MALACCA: Griffith 4297!; Maingay K.D. 1257!, 1272!; at Sungei Udang, Holmberg 778!. JOHORE: at Batu Pahat, Ridley 11030!. SINGAPORE: at Bukit Timah, Choa Chu Kang and Turong, Ridley 3459!, 5998!, 10776!.

Scortechini's specimens, as also Ridley 3373! from Selitar and 4704! from Dalvey road, Singapore, have thinner less acuminate and less shining leaves, fewer flowers in the clusters and lighter coloured branchlets, but otherwise seem to belong to this species, and are scarcely worthy of being classed as a variety. Griffith 4297 is the ♀ plant of a stiff reddish brown form with long-

pedunculate umbellules. It may prove to be a separate species, when ♂ flowers and fruit are known.

I believe this species to be identical with *Lindera lucida*, Boerl. Handb. Fl. Ned. Ind. III. 147; Koord. & Val. Bijdr. X. 238, etc. I have spent some time over the question, which must have previously been considered by the author of the Fl. Br. Ind., and in deference to him I leave '*malaccensis*' as the specific name, though I fear that it may have to give way to '*lucida*.'

2. *LINDERA WRAYI*, Gamble in Kew Bull. 367 (1910). A small tree; branchlets moderately stout, smooth, black when dry; innovations and lanceolate leaf-buds ferruginous-puberulous. *Leaves* chartaceous or almost membranous, alternate; obovate or elliptic-obovate, or -oblanceolate, long cuspidate-acuminate at apex, occasionally rounded or even emarginate, long-cuneate-acuminate at base; both surfaces glabrous, the upper nearly black when dry, somewhat bullate, the lower reddish; 10—18 cm. long, 3—6 cm. broad; midrib slender, slightly impressed; main nerves 8—14 pairs, impressed above, curved upwards to join in loops near the margin; transverse nervules prominent beneath, regular, arched; reticulation obscure; petiole slender, 8—18 mm. long. *Flowers* in umbellules on slender glabrous peduncles 5—7 mm. long in short axillary or lateral racemes about 7 mm. long; involucre bracts 4, hemispheric, glabrous, deciduous; flowers in each umbellule (♂) about 7, (♀) about 8; pedicels very short; perianth-lobes ovate acute, often lobed, 1—2 mm. long, smaller in ♀ than in ♂, glabrous. *Stamens* in ♂ flowers 9, slender, glabrous, 2 mm. long; those of 1st and 2nd rows with slender filaments and obtuse anthers; those of 3rd row similar but less obtuse and with a pair of large angular glands a little above the bases of the filaments; rudimentary ovary small, conoidal. *Staminodes* of ♀ flowers 9, very minute; those of 1st and 2nd rows linear clavate, glabrous; those of 3rd row subulate with a pair of large angular glands about the middle of the filaments. *Ovary* ovoid; style long, thick, curved; stigma peltate, lobed. *Fruit* (immature) an ovoid drupe 7—10 mm. long on a much thickened pedicel, pericarp smooth.

PERAK: on Gunong Batu Pateh 1300 m. alt., on Gunong Brumber and Gunong Iras, 1500 m. alt., Gunong Bubu, 2000 m. alt., Wray 399!, 1564!, 3866!, 4149!; at Bujong Malacca, Ridley 9706!; *Scortechini*!.

Scortechini's specimens and Wray 399 have thinner more reddish leaves than the others, but I see no reason to separate them. Wray 1564 is a

specimen with rounded or emarginate leaves, but this is probably due to insect action or browsing when young.

3. *LINDERA OXYPHYLLA*, Hook. f. in Fl. Br. Ind. V. 183 (1886). A tree reaching 9—12 m. in height (Curtis); branchlets stout, blackish grey, the younger ones black when dry and smooth, glabrous except the innovations; leaf-buds lanceolate, ferruginous-pubescent. *Leaves* subcoriaceous, alternate; lanceolate or elliptic-lanceolate, acuminate at apex, cuneate at base; the upper surfaces nearly black when dry, glabrous, the lower subglaucous; 8—13 cm. long, 3—4 cm. broad; midrib rather slender; main nerves about 12 pairs, obscure, curving to the margin; secondary nerves few, between the main nerves; transverse nervules very few, obscure as is the reticulation; petiole black, channelled, 7—12 mm. long. *Flowers* in umbellules, on peduncles about 5 mm. long in short axillary and lateral ferruginous-pubescent racemes near the ends of the branchlets, 10—12 mm. long; involucre bracts 4, hemispheric, 4 mm. long, deciduous; flowers in each umbellule about 9—10; pedicels stout, short; perianth-lobes obovate-spathulate. *Stamens* of ♂ flowers 9; those of the 1st and 2nd rows on villous filaments 3 mm. long; those of the 3rd row with rather shorter filaments and 2 large reniform glands at their base, anthers ovoid 1 mm. long with large cells; rudimentary ovary small, conoidal. *Staminodes* of ♀ flowers and *fruit* not known. *Tetranthera oxyphylla*, Wall. Cat. 2547; Miq. Fl. Ind. Bat. I. 1. 957. *Daphnidium oxyphyllum*, Nees in Wall. Pl. As. Rar. II. 63 and Syst. Laur. 618. *Aperula oxyphylla*, Blume Mus. Bot. Lugd.-Bat. I. 366; Meissn. in DC. Prodr. XV. i. 240.

PENANG: Wallich 2547!; Government Hill at 750 m. alt., Curtis 1103!

4. *LINDERA POLYANTHA*, Boerl. Handl. Fl. Ned. Ind. III. 147 (1900). A moderate-sized tree; branchlets nearly black, angular, striate, the youngest ferruginous-puberulous as are the lanceolate naked leaf-buds and the inflorescence. *Leaves* chartaceous, alternate; lanceolate, acuminate at apex, acute, often unequally, at base; upper surface reddish-brown, glabrous, shining, the lower also reddish, often glaucescent; 9—11 cm. long, 3—4 cm. broad; midrib rather stout; main nerves 7—8 pairs, oblique, curved to the margin, somewhat raised on the upper surface; transverse nervules obscure as is the reticulation; petiole 10—15 mm. long, channelled, slender. *Flowers* in umbellules on peduncle 7—8 mm. long in short axillary

or lateral ferruginous-puberulous racemes 10—15 mm. long, the rhachis angular; involucre bracts 4, hemispheric, deciduous, densely ferruginous-puberulous; flowers in each umbellule about 12; pedicels short; perianth-lobes ovate-oblong, villous within, 1.5 mm. long. *Stamens* of ♂ flowers 9; those of 1st and 2nd rows ovate, acute, on villous filaments; those of 3rd row similar and with a pair of large glands near the base; rudimentary ovary small, glabrous, conoidal, the style short and stigma small. *Staminodes* of ♀ flowers not known. *Fruit* a globose berry, 8—10 mm. in diam., minutely apiculate; pericarp thin. Koord. & Val. Bijdr. X. 236. *Aperula polyantha*, Bl. Mus. Bot. Lugd.-Bat. 366, 367; Meissn. in DC. Prodr. XV. 1. 241. *Polyadenia polyantha*, Nees Syst. Laur. 577; Miq. Fl. Ind. Bat. I. 961. *Laurus polyantha*, Bl. Bijdr. 554.

PERAK: at Bujong Malacca, *Scortechini* 148!—DISTRIB. Java.

5. *LINDERA PIPERICARPA*, Boerl. Handl. Fl. Ned. Ind. III. 147 (1900). A small tree reaching 9—12 m. in height; branchlets slender, nearly black, uppermost puberulous. *Leaves* membranous, alternate; lanceolate or oblong-lanceolate, acuminate at apex, acute or rounded at base; upper surface shining, olive-green, glabrous except on the midrib, lower glaucescent, puberulous especially on the nerves; 6—15 cm. long, 2—4 cm. broad; midrib slender, black, pubescent; main nerves 8—12 pairs, curving outwards to join in loops near the margin; transverse nervules straight, fairly prominent; reticulation obscure; petiole slender, 1—2 cm. long. *Flowers* in umbellules on slender 5—10 mm. long peduncles in clusters or short grey-puberulous racemes, scarcely 1 cm. long, from the internodes of the branchlets; bracts grey-puberulous, deciduous; involucre bracts 4, semi-orbicular, concave, glabrous without, villous within, 2—3 mm. long, gland-dotted; flowers in each umbellule about 6; perianth-lobes ovate, obtuse, villous at the base within. *Stamens* of ♂ flowers 9 with 2-celled anthers; those of the 1st and 2nd rows 1 mm. long, with slender pubescent filaments; those of the 3rd row 1.5 mm. long, with a pair of rather large reniform glands about the middle of the filaments; rudimentary ovary small, conoidal. *Staminodes* of ♀ flowers not known. *Fruit* a globose berry, the size of a small pea (4—5 mm. in diam.) shortly beaked, black, seated on the slightly enlarged perianth-tube. *Aperula* ? *pipericarpa* Meissn. in DC. Prodr. XV. 1. 242. *Polyadenia pipericarpa*, Miq. Fl. Ind. Bat. I. 1. 962.

PERAK: *Scortechini* 290!; in rocky localities in forest at 900—1200 m. alt., *King's Collector* 6948!—DISTRIB. Sumatra.

6. *LINDERA BIBRACTEATA*, Boerl. Handl. Fl. Ned. Ind. III. 146 (1900). A slender shrub reaching 3 to 4.5 m. in height, or a small tree; branchlets very slender, terete, the uppermost and the lanceolate leaf-buds silkily tawny-villous. *Leaves* chartaceous, alternate; ovate- or elliptic-lanceolate, long and sharply caudate-acuminate at apex, acute or rounded at base; upper surface olive-brown, shining, glabrous except on the ribs; lower surface glaucescent, the ribs at the base very villous; 7—11 cm. long, 2 to 3.5 cm. broad; ribs 3, the midrib extending to the extreme tip of the acumen, the side ribs starting from about 2 mm. above the base, and extending to nearly two-thirds of the length of the leaf; main nerves 1 to 3 from the midrib above half its length, curving to the margin and joining in loops, outside the side ribs 10 or more short nerves arched near the margin; transverse nervules slender, prominent beneath, irregular, joined by a minutely areolate reticulation; petiole very slender, tawny-villous, 6—12 mm. long. *Flowers* in sessile umbellules in axillary clusters; involucre bracts 2 to 4, the outer if present often small, glabrous except theciliate margins; flowers in each umbellule 1—3, usually 1; pedicels short, densely villous; perianth-lobes 6, oblong, obtuse, 2 mm. long, glabrous within, villous without, narrower and shorter and more acute in ♀. *Stamens* of ♂ flowers 9 or more, usually 9; those of the two outer rows with obtuse anthers and villous filaments; those of the inner rows rather longer but similar and with a pair of rather large glands a little above the bases of the filaments; rudimentary ovary ovoid with short style and peltate stigma. *Staminodes* of ♀ flowers also 9 to 12; those of the outer rows linear-clavate with villous filaments; those of the inner rows similar and with a pair of stipitate glands at the very base. *Ovary* ovoid, glabrous; style twisted; stigma capitate. *Fruit* a globose drupe up to about 1 cm. in diam.; enlarged perianth-tube scarcely any; pedicel clavate, 1 cm. long. Koord. & Val. Bijdr. X. 233. *Daphnidium bibracteatum*, Nees Syst. Laur. 615; Blume Mus Bot. Lugd.-Bat. I. 351; Meissn. in DC. Prodr. X. 1. 229. *D. acuminatum*, Blume l.c.; Meissn. l.c. *D. caesium*, Miq. Fl. Ind. Bat. I. 1. 976 *in part* only. *Laurus bibracteata*, Bl. Bijdr. 553. *L. acuminata*, and *L. microphylla*, Reinw.; Nees l.c. 611.

PERAK: on Maxwell's Hill, etc., up to 1200 m. alt., Wray 1193!, 2945!, 4162!; Larut at 450 to 600 m., King's Collector 2641!; *Scortechini* 640!; at Hermitage 900 m., Curtis 1332!; at Gunong Keladang, Ridley 9589!, at Taiping, Ridley 14515!.—DISTRIB. Java (Bantam, Forbes 354!)

Wray Nos. 1193, 4162 are fruiting specimens only and have rather smaller less acuminate leaves, not so glaucous beneath; so I am not quite sure of them.

7. *LINDERA CÆSIA*, Boerl. Handl. Fl. Ned. Ind. III 146 (1900). A small tree reaching 3 to 4.5 m. in height and a diameter of stem of 5 to 8 cm.; branchlets slender, dark brown, rather rough, the uppermost densely villous, the innovations silkily tawny-villous. *Leaves* chartaceous, alternate; elliptic-ovate or -lanceolate, long-acuminate at apex, rarely caudate, acute at base; upper surface smooth, glabrous except on the ribs, lower surface bluish green when fresh, glaucous when dry; 6—10 cm. long, 3—5 cm. broad; ribs 3, the midrib prominent, reaching the tip of the acumen, the side ribs starting from 4—5 mm. above the base, curving and ending in small loops about half-way up; main nerves from the midrib 2—5 pairs, prominent, joined near the margin by arching loops, nerves outside the side ribs about 6—8, short; transverse nervules irregular, branched and anastomosing; reticulation areolate: petiole 6—10 mm. long, slender, blackish-villous. *Flowers* in sessile umbellules in close axillary clusters; involucre bracts 2—3, if more than 2 the outer quite small, glabrescent without; flowers in each umbellule 3, sessile or on very short villous pedicels; perianth-lobes 6, lanceolate-acuminate, 1—2 mm. long, gland-dotted, villous without and at base within. *Stamens* of ♂ flowers 9 or 12; much longer than perianth-lobes, up to 5 mm., with oblong short anthers and slender villous filaments, those of the outer rows shorter than those of the inner, the inner with a pair of rounded rather small glands at the very bases of the filaments; rudimentary ovary ovoid with short curved style and large peltate stigma. *Staminodes* of ♀ flowers and fruit not known. *Daphnidium cæsium*, Nees in Mus. Bot. Lugd.-Bat. I. 351; Meissn. in DC. Prodr. XV. I. 229; Miq. Fl. Ind. Bat. I. 1. 976 (in part only).

PERAK: Maxwell's Hill, *Scortechini* 14!, 1200 m. alt., *Curtis* 2052!; dense forest near Larut at 1000—1200 m. alt., *King's Collector* 6951!. SELANGOR: at Sempang, *Ridley* 15597!.—DISTRIB. Java.

I believe and hope I am correct in the identification of this species from the Java specimens in the Calcutta Herbarium and from descriptions.

8. *LINDERA RUFA*, Gamble. A shrub reaching 2 m. in height; branchlets rather stout, rough, brown, uppermost ferruginous-villous as are the innovations; buds ovoid, perulate, the scales

obtuse. *Leaves* coriaceous, alternate; ovate or ovate-lanceolate, long acuminate at apex, acute at base; upper surface olive-brown when dry, shining or dull, glabrous except on the midrib, lower surface tawny-villous when young, glaucous when old, margins recurved; 4—7 cm. long, 2—3 cm. broad; ribs 3, midrib stout, produced to the tip of the acumen, impressed and usually villous above, side ribs from 4—5 mm. above the base, nearly straight, ending about half-way up; main nerves from the midrib 2—3 pairs, irregular, nerves outside side ribs 0 or few; transverse nervules very faint, reticulation areolate; petiole slender, tawny-villous, 10—15 mm. long. *Flowers* in umbellules, sessile or very shortly pedunculate in axillary tawny-villous clusters or racemes; involucre bracts 4, hemispherical, very much gland-dotted, glabrous within; flowers in each umbellule 1 to 3 on very short long-villous pedicels, perianth-lobes 6, unequal, ovate or ovate-oblong, 1.5—2 mm. long, gland-dotted, long-tawny-villous at base within as is the very short perianth-tube. *Stamens* of ♂ flowers usually 9, glabrous except at the base; those of the outer rows with shortly oblong anthers and slender filaments; those of the inner row similar and with a pair of large reniform stipitate glands at the base; rudimentary ovary ovoid, with short style and peltate stigma. *Staminodes* of ♀ flowers 9 to 12, clavate, those of outer rows longer than those of the inner which have glands at the base as in ♂. *Ovary* ovoid; style thick, twisted; stigma capitate, lobed. *Fruit* (immature) an ovoid drupe 6 mm. long, seated on the persistent perianth-lobes and staminodes; pedicel thickened and lengthened; pericarp shining. *Lindera cæsia*, Reinw. var. *rufa*, Stapf in Trans. Linn. Soc. 2nd Ser. IV. 220.

PERAK: Ulu Batang Padang 1500 m., Gunong Brumbu Pahang 2100 m. and Gunong Bubu 1500 m., Wray 1571!, 1531!, 3921!; *Scortechini*!; high rocks on Gunong Batu Pateh 900—1200 m. alt., *King's Collector* 8066!. SELANGOR: top of Ulu Semangko, *Ridley* 12060!.—DISTRIB. Borneo (Kinabalu 2500 m., *Haviland* 1106!); Sumatra (Mt. Dempo 2200 m., *Forbes* 2394!).

Tribe VIII. CASSYTHEAE.

16. CASSYTHA, Linn.

Filiform twining parasites, adhering to their host by suckers. *Leaves* consisting of minute scales or none. *Flowers* small, herma-

phrodite, sometimes dimorphic, spicate, capitate or racemose; bracteoles 3. *Perianth*-tube short and globose or turbinate and as long as the lobes; segments 6, the 3 outer smaller. Perfect *stamens* 9 or 6, 2-celled; those of the 1st row opposite the outer perianth-lobes, introrse, those of the 2nd row opposite the inner perianth-lobes, introrse, sometimes reduced to staminodes; those of the 3rd row opposite those of the 1st row, extrorse, the filaments with a pair of glands at the base; within these and opposite those of the 2nd row 3 sessile or stipitate staminodes. *Ovary* globose, free in flower but included in the perianth-tube, which closely covers it in fruit; style short; stigma subsessile, small or capitate. *Fruit* a drupe enclosed in the enlarged inflated perianth-tube which is crowned by the remains of the lobes and stamens; pericarp of two layers, the outer thin and smooth, the inner thick and hard. *Seed* conform to the drupe; testa thin; cotyledons fleshy, at length confluent.—DISTRIB. Species about 15, chiefly Australian, with a few S. African, one in Borneo and one widely distributed.

CASSYTHA FILIFORMIS, Linn. Sp. Pl. (1753) 35. *Stems* very long, cord-like, much twisted together, often branched, glabrous or pubescent, dark green. *Flowers* in lax or dense lateral spikes 1·5—5 cm. long; bracteoles small, rounded, ciliate; rhachis puberulous. *Perianth*-tube turbinate, about 2 mm. long; lobes 6, the 3 outer very small, rounded, ciliate; the 3 inner oblong, concave, valvate. *Stamens* of the 1st row ovate, with broad filaments; those of the 2nd row with narrow filaments; those of the 3rd row triangular, with sessile rounded glands; staminodes of the 4th row triangular, acute, subsessile. *Fruit* a globose white drupe, 5—7 mm. in diameter with a hard pericarp enclosed in the fleshy enlarged perianth-tube which is crowned by its segments. Nees Syst. Laur. 642; Meissn. in DC. Prodr. XV. 1. 255; Wight Ic. t. 1647; Wall. Cat. 2608, 7534; Roxb. Fl. Ind. II. 314; Dalz. and Gibs. Bomb. Fl. 223; Griff. Notul. IV. 353; Hook. Fl. Exot. t. 167; Benth. Fl. Austral. V. 311; Trimen Fl. Ceyl. III. 555; Hook. fil. Fl. Br. Ind. V. 188; Prain Beng. Plants 904; Cooke Bomb. Fl. II. 541. 'Acatsjavalli' Rheede Hort. Mal. VII. t. 44.

MALAY PENINSULA: Gwynne-Vaughan 243!. PENANG: Wallich; Curtis 1203!. PERAK: King's Collector 4956!. PAHANG: at Rumpin river, Ridley!. MALACCA: Griffith 4238!; Harvey!; at Sungei Udang, Goodenough 1384!. SINGAPORE, Ridley 3380!.—DISTRIB. Throughout India, Ceylon, Arabia, Mascarene Islands, Malay Archipelago, Australia, Polynesia, Tropical Africa, America.

Family CIII. HERNANDIACEÆ.

Trees or climbing shrubs. *Leaves* alternate, simple or pinnate, entire, exstipulate. *Flowers* bisexual or monoecious or polygamous, regular, usually small, white or greenish. *Perianth* superior; segments free or shortly united below in two valvate 3—5-merous whorls or more rarely in one imbricate 4—8-merous whorl; stamens 3—5 in a single whorl; anthers 2-celled, dehiscing introrsely or laterally by 2 valves; staminodes more or less glandular, in 1 or 2 whorls outside the stamens or absent; those of the outer whorl in pairs at the base of the stamens, those of the inner whorl alternate with them. *Ovary* inferior, 1-celled; ovule solitary, pendulous, anatropous. *Fruit* dry, often longitudinally ribbed, sometimes with 2—4 longitudinal wings (*Illigera*) or with 2 terminal wings formed by accrescent perianth-segments (*Gyrocarpus*) or wingless and enclosed in an inflated cupule (*Hernandia*). *Seed* solitary, exalbuminous; embryo straight; cotyledons large, plano-convex, more or less lobed or flattened and spirally twisted. **DISTRIB.** About 35 species, tropical.

Leaves trifoliolate; fruit with 2—4 broad lateral wings .. 1. *Illigera*.

Leaves simple or peltate; fruit ovoid, not winged but enclosed in the inflated cupule .. 2. *Hernandia*.

Leaves broadly ovate, usually lobed; fruit with two long wings formed by enlarged perianth-lobes .. 3. *Gyrocarpus*.

(1) *Illigera* and (3) *Gyrocarpus* have already been described under *Combretaceæ*, Journ. As. Soc. Beng. LXVI. II (1897), pp. 342-345. The genus *Illigera* has later been revised by S. T. Dunn in Journ. Linn. Soc. Bot. XXXVIII, 290, and the following species admitted as belonging to the Malay Peninsula.

1. *I. trifoliata*, Dunn = *I. appendiculata*, Kurz For. Fl. Burma I. 469 (non Blume); King in Journ. As. Soc. Beng. LXVI. II. 343.

2. *I. pulchra*, Blume Bijdr. 1153 = *I. lucida*, Teysm. & Binn.; King, l.c. 344.

2. *HERNANDIA*, Linn.

Evergreen trees. *Leaves* alternate, ovate or peltate, entire, 3—7-ribbed. *Flowers* monoecious, 3-nately involucrate at the ends of the branches of a lax panicle; each involucre with 3 flowers, the central one ♀ with a cupular involucre at the base of its peduncle, enclosing the ovary; the two lateral ones ♂, also shortly peduncled; bracts of the involucre 4—5, subvalvate in bud. *Perianth*-lobes subvalvate, those of the ♂ 3 to 6, those of the ♀ 4 to 8. *Stamens* as many as

and opposite to the outer perianth-lobes, the filaments with 1—2 glands or sometimes none at the base; anthers 2-celled, extrorsely or marginally dehiscent with longitudinal valves attached to the connective; staminodes in ♀ flowers usually 4. *Ovary* inferior, fleshy; style included in the tube, clavate at tip; stigma dilated, toothed or lobed. Fruit a drupe, enclosed in the enlarged inflated involucrel having a terminal circular orifice; pericarp ribbed or smooth, with a terminal umbilicus. *Seed* conform to the fruit, exalbuminous; testa thick, crustaceous, open at the apex opposite the radicle; cotyledons fleshy, hemispheric, lobed, ruminant; radicle short, superior.—**DISTRIB.** Species 8—12, in tropical regions of both worlds.

HERNANDIA PELTATA, Meissn. in DC. Prodr. XV. 1. 263 (1864). A tree; branchlets stout, smooth, marked with the scars of fallen leaves. *Leaves* rather coriaceous; broadly ovate, peltate, acute or obtuse at apex, rounded truncate or subcordate at base; margin entire, recurved; ribs 5—7 from the insertion of the petiole, usually 1—2 cm. above the base, all raised on the lower surface, nerves from the midrib about 5 pairs, about as many also from the innermost pair of ribs; reticulation prominent beneath; 10—20 cm. long, 7—15 cm. broad; petiole stout, terete, about 7 cm. long. *Panicles* 10—15 cm. long, corymbose, hoary-puberulous; bracts in pairs, ovate-spathulate, 3—5 mm. long; involucrel bracts 5—7 mm. long, oblong, obtuse; pedicels short; ♂ flower with 6, ♀ flower with 8 perianth-lobes about 5 mm. long; involucrel of ♀ flower cup-shaped, truncate. *Stamens* 3 each with 2 clavate glands at the bases of the filaments; staminodes of ♀ flower subglobose. *Fruit* an oblong 8—10-ribbed drupe 2 cm. long with a terminal rounded boss 5 mm. long, enclosed in the enlarged inflated lanceolate involucrel which is open at top in a circular orifice; pericarp leathery, smooth without. *Seed* globose, 1—5 cm. in diam; testa crustaceous, emarginate at apex; cotyledons fleshy, palmately lobed, ruminant. Kurz For. Fl. II, 309; Bedd. Fl. Sylv. Madr. t. 300; Benth. Fl. Austral. V. 314; Hook. f. in Fl. Br. Ind. V. 188; Trimen Fl. Ceyl. III. 456; Koord. & Val. Bijdr. VII, 108; Brandis Ind. Trees, 542. *H. sonora*, Linn. Sp. Pl. I. 981 *in part*; Bl. Bijdr. 550; Wight Ic. t. 1855; Wall. Cat. 7811; Miq. Fl. Ind. Bat. I. 1. 887.

DINDINGS: at Pangkore Laut at sea level, Wray 4252!; Curtis 3446!. **SINGAPORE**: Wallich 7811 D.!—**DISTRIB.** Ceylon, Andamans, Malay Archipelago, N. Australia, Pacific Islands, E. Africa, Madagascar.

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Materials for a Flora of the Malayan Peninsula. No. 24.

*By J. SYKES GAMBLE, C.I.E., M.A., F.R.S., late of the
Indian Forest Department.*

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Materials for a Flora of the Malayan Peninsula, No. 24.—By J.
SYKES GAMBLE, C.I.E., M.A., F.R.S., late of the
Indian Forest Department.

This Part contains the Families Nos. 96 Nepenthaceæ, 98 Piperaceæ, 104 Proteaceæ and 107 Loranthaceæ. The account of the Family of the Nepenthaceæ has most kindly been contributed by Prof. J. M. Macfarlane, Director of the Botanic Garden at the University of Philadelphia, U. S. America, author of the Monograph of the Family in Engler's Pflanzenreich. The account of the large Family of the Piperaceæ is due to the kindness of Monsieur C. de Candolle of Geneva. The other two Families are my own work.

The new species in the Piperaceæ, 54 in number, were published as Part No 1 in Vol. VI of the Records of the Botanical Survey of India. Three new species in Proteaceæ, by Lieut.-Col. Sir D. Prain, C.M.G., C.I.E., F.R.S., Director of the Royal Gardens, Kew, and two by myself have been published in the Kew Bulletin, as well as 6 new species in Loranthaceæ. The total number of new species is thus 65.

Family XCVI. NEPENTHACEÆ.

By J. M. MACFARLANE.

Suffrutescent or frutescent, climbing, rarely erect or prostrate plants. *Stem* cylindric to trigonous. *Leaves* alternate, sessile or petiolate, often decurrent, divisible into basal lamina, excurrent tendriform midrib, terminal inflated ascidiform midrib usually bearing ciliate laminar wings, also with orifice bounded by a corrugated peristome and lid at first closing but later arching over pitcher orifice; lamina and specially pitcher glandular, adapted for the attraction and catching of insects. *Inflorescence* a raceme of cymes condensing usually to a simple raceme, with small green, yellow or claret-coloured often ebracteate flowers. *Flowers* dioecious, regular, monochlamydeous. *Sepals* 4, rarely 3, in decussate pairs, glandular and nectariferous within, persistent. *Stamens* monadelphous, anthers rarely indefinite or 6—4, usually 12—8, aggregate into a globose mass. *Pistil* of 4, rarely 3, synarpous carpels; ovary oval to ovate, usually hairy, 4—3-celled with numerous minute ovules; style short or absent; stigma 1—3-lobed. *Fruit* a leathery or subwoody loculicidal capsule. *Seeds* small, albuminous, with membranous filiform

bicaudate testa and embryo in axis of albumen.—DISTRIB. Madagascar to Philippine Islands and N. Australia; one genus with about 65 species.

NEPENTHES, Linn.

Characters as given above.

- Inflorescence a raceme of paniculate cymes; pitcher lid small, reflexed 1. *N. ampullaria*.
- Inflorescence a raceme, pedicels 3—1-flowered.
- Longitudinal leaf-veins 2 to 4 pairs.
- Leaves sessile, more or less amplexicaul, non-decurrent.
- Leaf-veins 2 pairs, marginal, obscure, pitcher elongate with white tomentose collar below the corrugated, peristome .. 2. *N. albo-marginata*.
- Leaf-veins 3 pairs, marginal, obscure, pitcher elongate with dull tomentose collar below the peristome .. 3. *N. gracillima*.
- Leaf-veins 4 pairs, disposed between rib and margin, lid glabrous within; pedicels usually 1-flowered .. 4. *N. singalana*.
- Leaf-veins 4, rarely 5, pairs, disposed between rib and margin, lid glabrous within; pedicels 3—2-flowered at least below .. 5. *N. sanguinea*.
- Leaf-veins 4 pairs, lid with long rigid hairs within; pedicels biflorous, bracteolate .. 6. *N. Macfarlanei*.
- Leaves sessile, decurrent, leaf-veins 2, rarely 3 pairs; pedicels biflorous below, uniflorous above .. 7. *N. Reinwardtiana*.
- Longitudinal leaf-veins 5—6 pairs.
- Leaves sessile, amplexicaul, decurrent; peristome uniform, narrow .. 8. *N. gracilis*.
- Leaves petiolate; peristome of pitcher elongated posteriorly into a high neck .. 9. *N. Rafflesiana*.
- Longitudinal leaf-veins 7—10 pairs.
- Leaves petiolate, herbaceous, margin delicately ciliate-dentate .. 10. *N. phyllamphora*.

1. NEPENTHES AMPULLARIA, Jack in Comp. Bot. Mag. I. 271 (1835). A tall climbing shrub, sometimes with prostrate branches. Stem 12—20 m. high, cylindric, ferrugineo-tomentose when young, at length brown glabrous, internodes usually elongated. Leaves 10—35 cm. long, 4—9 cm. broad, petiolate, half-amplexicaul; petiole winged, gradually expanding into a lamina; lamina lanceolate to obovate, ferrugineo-tomentose when young at length glabrous, sparsely hairy beneath; longitudinal veins 4, rarely 3 pairs, parallel, united by oblique parallel nerves; leaves on prostrate branches often crowded

reduced, with clustered richly-coloured pitchers; tendril 5—8 cm. long, hirsute; pitchers usually small, 3—5 cm. long, 2—3 cm. broad, often larger on prostrate shoots, ventricose to subcylindric, green to purple-green, often blotched or marbled with claret; wings broad with doubly-ciliate margins; peristome transverse, narrow and recurved outwardly, wide and obliquely descending within, green, or purple-striped, lid narrow elliptic, reflexed, eglandular; pitcher within uniformly glandular, shining. *Inflorescence* 15—35 cm long; raceme of many dense 2—5-flowered ferrugineo-tomentose cymes. *Sepals* 4, external pair larger, yellow-green, glandular within. *Staminal column* shorter than sepals, glabrous, anthers 12—8. *Ovary* ovoid, \pm tetragonous, stigmatic lobes triangular. *Capsule* 2.5—3 cm. long, pubescent to subglabrous. *Seeds* 12—15 mm. long. Korthals Verh. Nat. Gesch. Bot. 39, t. 13; Hook. f. in Bot. Mag. t. 5109 and in DC. Prodr. XVII. 93; André in Ill. Hort. XXIV. 45, t. 272; Hook. f. Fl. Br. Ind. V. 69; Macfar. in Engl. Pfl.-reich IV. iii. 33, t. 13. *N. ampullacea*, Low Sarawak 69; Miq Fl. Ind. Bat. I. i. 1076.

PERAK: at Larut, *Kunstler* 4087!, 4148!, 6222!; at 100—300 ft. alt. *Wray* 600!, 1794; at Ipoh, *Curtis*!. MALACCA: at Padang Batu on Mt. Ophir and Ayer Punas, *Cuming*!; *Griffith*!. JOHORE: *Burbidge*; *Jensen*. SINGAPORE: *Jack*!; *Wallich* 2243!; *Maingay* K.D. 1322!; *T. Anderson* 161!, 163!, 164!, 166!. BINTANG: *Jack*!; *Wallich*!.—DISTRIB. Malaya to Sumatra, Borneo and N. Guinea.

2. *NEPENTHES ALBO-MARGINATA*, Lobb in Gard. Chron. (1849) 580. A slender climbing shrub. *Stem* 5—10 m. high, subcylindric to trigonous, densely white to grey stellate-pubescent when young, at length almost glabrous, internodes short below, elongating upwards. *Leaves* 10—30 cm. long, 1—4 cm. broad; broadly amplexicaul, scarcely decurrent, expanding from a subpetiolate base into an elliptic-lanceolate lamina, above and below stellate-pubescent, at length glabrous, margin ciliate, revolute in drying; longitudinal veins 2 pairs, obscure; transverse nerves few, reticulate; tendril short; pitcher 5—15 cm. long, 1.5—3 cm. broad, green and purple-striated or almost purple, subdimorphic; lower pitchers subventricose below, cylindric above, with expanded ciliate wings, upper tubular with shallow non-ciliate wings or ridges, peristome cylindric, uniform, sharply striate, purple-green to purple, bounded below externally by a grey or white tomentose collar; lid 1.5—2.5 cm., ovate to orbicular, richly glandular within; spur simple or 2—3-fid. *Inflorescence* 20—30 cm. long, racemose, loosely flowered, lower pedicels 2 upper

1-flowered. *Sepals* 4, elliptic, tomentose without, glandular within. *Staminal column* equal to sepals, tomentose, anthers 12—8. *Ovary* tomentose. *Capsule* 2.5—3 cm. long, valves attenuate, truncate at apex. *Seeds* 12 mm. long. Hook. f. in Trans. Linn. Soc. XXII. 422, t. 73; Masters in Gard. Chron. (1872) 542; Hook. f. in DC. Prod. XVII. 102 and Fl. Br. Ind. V. 70; Burbidge in Garden XVI, 542 ic. col; Macfar. in Engl. Pfl-reich IV. iii. 37. *N. tomentella* and *N. Teysmanniana*, Miq. Fl. Ind. Bat. I. i. 1073, 1075.

PENANG: *King's Collector* 1720!, 1723!, alt. 2000—2700 ft. at Penara Bukit, *Curtis' Collector*!, probably also *Wallich* 2244!; *Lobb*!; *Walker* 13!, alt. 2000 ft., *Hullett* 163!. PERAK: at Larut, *King's Collector* 2022!, alt. 800 ft. MALACCA: on Mount Ophir, *Lobb*!; *Hullett* 872!; *Whitehead*.—DISTRIB. Malaya to Sumatra and Berneo.

3. *NEPENTHES GRACILLIMA*, Ridley in Journ. Linn. Soc. XXXVIII 320 (1908). A slender climbing shrub. *Stem* trigonocylindric, glabrous. *Leaves* 5—10 cm. long, 1—1.5 cm. broad; sessile, half amplexicaul, coriaceous, lanceolate, glabrous; longitudinal veins 3 pairs united by reticulate transverse nerves; tendril slender below thickened towards pitcher; pitchers 5—10 cm. long, 1—1.5 cm. broad, subcylindric, widest at middle, pale green with elongated purple areolae, wings narrow, sparsely ciliate above, reduced to shallow non-ciliate ridges below; peristome uniform, cylindric, oblique, elevated posteriorly, faintly striate, bounded below by a dull densely tomentose external collar; lid 1—1.5 cm., ovate, with large circular glands within; spur simple, recurved; pitcher within smooth glaucous purple above, glandular and shining over lower half. *Inflorescence* 12—20 cm. long; raceme shorter than peduncle, slender; pedicels 1-flowered, bracteolate. *Sepals* oval, densely tomentose without and along inner margin. *Staminal column* equal to sepals, pubescent below, glabrous above, anthers 8—6. Female flower unknown. *Capsule* 14—15 mm. long, fusiform, valves lanceolate, sparsely pubescent.

PAHANG: at Telom, *Ridley* 13704!; on Mt. Gunong Tahan about 3000 ft. alt., *Robinson* and *Wray* 5309!.

4. *NEPENTHES SINGALANA*, Beccari Malesia III 12. t. 3 (1886). A terrestrial or epiphytic climbing shrub, often drying brown black. *Stem* 2—3 m. high, 3—4-gonous, pubescent, at length glabrous. *Leaves*

6—20 cm. long, 2.5—4.5 cm. broad, sessile, widely amplexicaul, coriaceous, elliptic-lanceolate, pilose at apex and base when young, at length glabrous; longitudinal veins 4, rarely 3 or 5 pairs, transverse nerves obscure, irregularly reticulate; tendril 15—25 cm. long, thickened upwards towards pitcher; pitchers subdimorphic, lower cylindric-ventricose with narrow ciliate or dentate wings, upper cylindric with shallow wings or ridges; peristome cylindric, transverse or slightly oblique, finely striate; lid 2.5—4 cm. cordate-orbicular, glabrous, with immersed glands on the inner side; pitcher within glaucous purple over upper, glandular over lower half. *Inflorescence* 10—25 cm. long; raceme with 1- rarely 2-flowered pedicels. *Sepals* 4, margins tomentose. *Staminal column* longer than sepals, glabrous; anthers 12—10. *Capsule* 15—20 mm. long, brown, shining. *Seeds* 12—15 mm. long. Ridley in Journ. Linn. Soc. XXXVIII. 320 (1908) under name *N. Bongso*. Macfar. in Engl. Pfl.-reich IV. iii. 47.

PAHANG: on Mount Gunong Tahan, Robinson and Wray 5411; at 5000 ft. alt.—DISTRIB. Malaya, Sumatra.

5. *NEPENTHES SANGUINEA*, Lindl. in Gard. Chron. (1849) 580, f. 2. A terrestrial or epiphytic climbing shrub. *Stem* 2—7 m. long, trigonous, glabrous, apex pubescent, internodes short. *Leaves* 12—45 cm. long, 3—6 cm. broad, sessile, widely amplexicaul, lanceolate oblong, glabrous or slightly hairy beneath; longitudinal veins 4 rarely 5, obscure, parallel, united by obscure radiating nerves; tendril 10—20 cm. long, \pm pubescent; pitchers 10—30 cm. long, 5—8 cm. broad, subdimorphic, lower cylindric-ventricose, often greenish red to red, with expanded ciliate wings, upper cylindric to infundibuliform, reddish green or yellow-green and red spotted, with narrow usually non-ciliate wings or ridges; peristome narrowed anteriorly and posteriorly, widely expanded and sharply striate postero-laterally; lid 3—10 \times 2—8 cm. ovate-cordate, glandular within; pitcher within glaucous or purplish over upper half, yellow shining and glandular over lower half. *Inflorescence* 20—60 cm. long; raceme lax, pedicels delicate grey pubescent, lower 3—2-flowered upper 1-flowered. *Sepals* 4, reddish purple and glandular within. *Staminal column* pubescent below, glabrous above, anthers 8. *Ovary* quadrangular, pubescent. *Capsule* 16—25 mm. long. *Seeds* 8—12 mm. long. Griff. Not. IV. 348; Masters in Gard. Chron. (1872) 542; Hook. f. in DC. Prodr. XVII. 100 and Fl. Br. Ind. V. 70; W. G. Smith in Flor. Mag. (1874) t. 128; Planchon in Fl. d. Serr. XXII. 166, f. 2343; Veitch ort. Veitch. 303; Macfar. in Engl. Pfl.-reich IV. iii. 45. *N. pumila*,

Griff. Not. IV. 349; not *N. sanguinea* in Gard. Chron. (1882) II. 809 = *N. Veitchii*.

PERAK: *Wray* 129!; *Burbidge* on Taiping hills; *Engler* 5332!; hills near Larut, *King's Collector* 2022!, about 800 ft. elev., 2635!, at 2500—4000 ft. elev., 3307!, at 4600 ft. 3316!; Gunong Batu Putih, *King's Collector* 8018! at 3000—4000 ft.; on Maxwell's Hill 4400 ft. alt. *Fox* 183!; at Bujong Malacca, 4000 ft. alt. *Curtis* 3362!. PAHANG: at Kluang Terbang, *Barnes* 10912!. SELANGOR: at Bukit, *Kensall*!. MALACCA: at Gunong Ladong or Mount Ophir, *Griffith* 4411!; on Mount Ophir, *Lobb* 169!; *Ridley* 3174!; *Whitehead*. SINGAPORE: at Bubo, *Murton* 35! at 5000 ft.—DISTRIB. Malaya?, Borneo (*Burbidge*).

6. *NEPENTHES MACFARLANEI*, Hemsley in Proc. Linn. Soc. (1905) 12, in Gard. Chron. s. 3, XXXVII (1905) 241, 260, in Hook. Icon. Pl. XXIX tt. 2814, 2815 (1906). A low climbing often epiphytic shrub. *Stem* 2—3 m. high, trigonous, grooved, ferrugineo-hirsute when young. *Leaves* 6—20 cm. long, 2—3.5 cm. broad; sessile, semi-amplexicaul, ovate-lanceolate to obovate, glabrous or sparsely hairy along upper midrib; longitudinal veins 4 pairs, innermost starting one-third up from leaf base, transverse nerves obscure irregularly reticulate; tendril 10—20 cm. long uniform; pitchers 8—15 cm. long, 2.5—4 cm. broad, di- to tri-morphic, lower ventricose, pale green to whitish with abundant purple blotches, wings narrow below expanded and ciliate upward, mouth ovate oblique; peristome cylindric anteriorly, expanded postero-laterally, inner edge pectinate, lid 3—4.5 cm. orbicular-cordate, without glabrous, within bearing few to many long rigid unicellular hairs and circular nectar glands; pitcher within over upper third to half smooth glaucous-purple, below shining glandular; median pitchers cylindric; upper pitchers infundibuliform gradually narrowed into tendril, pale green with purple flecks and spots, wings narrow or reduced to prominent ribs, pitcher within smooth purple over triangular posterior upper area, glandular below. *Inflorescence* 15—25 cm.; raceme with biflorous hirsute pedicels each bracteolate at fork. *Sepals* 4, subovate, ferrugineo-pubescent without and with many minute glands within. *Staminal column* equal to sepals, puberulous below, anthers 6. *Ovary* ovate, shortly stalked, pubescent. *Capsule* 18—20 mm. long, shining, valves lanceolate with depressed bilobed stigma. *Seeds* 10—12 mm. long. Macfar. in Engl. Pfl.-reich IV iii. 77.

PERAK: *Scortechini*!; on Gunong Bubu, *Wray* 3849!; at 5000

ft. elev., *King's Collector* 7395!, at 5300 ft., 7421!; at Gunong Batu Putih, *Wray* 339!, at 6700 ft. *Wray* 1643!.—DISTRIB. Malaya.

7. *NEPENTHES REINWARDTIANA*, Miq. Pl. Jungh. I. 168 (1851). A graceful branched climbing shrub. *Stem* 2—3 m. high, triangular to subcylindric. *Leaves* 7—25 cm. long, 1—3.5 cm. broad, sessile, broadly amplexicaul, \pm decurrent, herbaceous, linear lanceolate, glabrous; longitudinal veins mostly 2, rarely 3 or 4 pairs, innermost starting from near middle of rib, transverse nerves obscure reticulate; tendril 15—30 cm. long, delicate but thickening upward; pitchers 10—20 cm. long, 2—4 cm. broad, nearly uniform, cylindric or slightly ventricose below, expanded toward mouth, glabrous, semi-membranous, pale green to purple green, wings in lower pitchers expanded non-ciliate, in upper reduced to ridges; peristome ovate, oblique, cylindric, uniform, faintly striate, lid elliptic- or orbicular-cordate, glabrous with many minute glands within, pitcher internally glaucous-violet over upper half or two-thirds, with two brown "eyes" on upper posterior triangular area, below shining glandular. *Staminal inflorescence* 20—45 cm., pistillate 10—15 cm. long; raceme lax, pedicels biflorous below uniflorous above. *Sepals* elliptic, glabrous, glandular along middle within. *Staminal column* longer than sepals, ferrugineo-tomentose below, anthers 8. *Ovary* densely tomentose. *Capsule* 25—30 mm. long, tetragonous, shining. *Seeds* 15—17 mm. long, testa around embryo brown, wings pale. Miq. Fl. Ind. Bat. I. i. 1075, Suppl. 151, 366 and III. Fl. Archip. Ind. 4 t. 4; Hook. f. in Trans. Linn. Soc. XXII 422 as *N. Reinwardtii*, in DC. Prodr. XVII 103 and Fl. Br. Ind. V. 70; Macfar. in Engl. Pfl.-reich IV. iii. 50.

PAHANG: *Hullett* 5716!? SINGAPORE: *Wallich* not 2244 = *N. gracilis*, but "prope Kuttalam lecta ab amicis Michel"!—DISTRIB. Malaya, Sumatra, Banka, Borneo, Singga, 100—200 ft. *Hullett* (*Ridley* 5693!).

8. *NEPENTHES GRACILIS*, Korth. Verh. Nat. Gesch. Bot. 22. t. 1 (1839). Much branched, delicate, low, climbing shrubs. *Stem* 2-3 m. high, greenish purple, trigonous, glabrous. *Leaves* 10—20 cm. long, 1.5—4 cm. broad, sessile, broadly amplexicaul, decurrent, linear to elliptic herbaceous, glabrous or slightly pubescent; longitudinal veins 5-7 pairs, united by irregular ascending nerves; tendril 6—10 cm. long delicate; pitchers 6—12 cm. long, 1—3 cm. broad, subdimorphic, lower cylindric-ventricose with \pm expanded ciliate wings, upper cylindric with narrow wings or non-ciliate ridges, pale green

with fine purple spots or coloring without and within; peristome narrow, cylindric, uniform, striate; lid 1—2.5 cm., orbicular-cordate, glabrous, glandular within; pitcher over upper half within glaucous green to purple, below shining glandular, upper row of glands large. *Inflorescence* 10—40 cm. long, slender; pedicels 1- rarely 2-flowered. *Sepals* elliptic, tomentose without. *Staminal column* shorter than sepals, glabrous; anthers 12—8, convolute. *Ovary* ovate, ferrugineo-tomentose. *Capsule* 2—3 cm. long, often curved, brown, shining. *Seeds* 15 mm. long. Spach Hist. Nat. des Veg. XIII 325, t. 144; Miq. Fl. Ind. Bat. I. i. 1071; Hook. f. in DC. Prod. XVII 104 and in Fl. Br. Ind. V. 71; Beccari Malesia III. 14; G. Beck in Wien. Ill. Gart. Zeit. (1895) 190; Macfar. in Engl. Pfl.-reich IV. iii. 58. *N. lavis*, Lindl. in Gard. Chron. (1848) 655. *N. Korthalsiana* Miq. l.c. 1071, Suppl. 151, 366, and Ill. Fl. Arch. Ind. (1871) 2 t. 1.

PENANG: at Batu Ferengy, *Curtis*!. PERAK: at Larut, *King's Collector* 1941!, 4019!, 4025!, 4084! at 100 ft. alt. DINDINGS: at Pulau Sembilan, *Curtis*!. MALACCA: *Jack*!; *Wallich* 2248!; *Cuming* 2310!; at Ayer Panas, *Derry*!; at Bukit Bruang, *Curtis*!. JOHOR: ? *Ridley* 11026!. SINGAPORE: *T. Anderson* 1671; at Changi, *Ridley*! at Bukit Timah, *Ridley* (Engl. 3911)!

N. gracilis var. *arenaria*, *Ridley* in Hbb. Kew and Calcutta *N.* 1473 is a dwarf pale form, that grew in wet sandy spots at Pramau in Pahang.

9. *NEPENTHES RAFFLESIANA*, *Jack* in Comp. Bot. Mag. I. 270 (1835). A tall rarely dwarf climbing shrub. *Stem* 15 m. or less, cylindric, branched, white tomentose when young, at length glabrous. *Leaves* 20—50 cm. long, 5—10 cm. broad, subcoriaceous, petiolate, petiole 5—15 cm. long, winged, semiamplexicaul; blade oblong to elliptic, densely white tomentose when young, later glabrous; longitudinal veins usually 5 pairs, inconspicuous; lateral nerves obscure obliquely ascending, parallel; tendril 20—40 cm. long, thickened toward pitcher; pitchers 10—20 cm. long, 7—12 cm. broad, dimorphic, lower ventricose, pale green or whitish green, richly purple spotted wings widely expanded below narrowed upward, ciliate; peristome ovate, oblique, elevated posteriorly into a high neck with dentate inner edge that carries lid, purple and green striped; upper pitchers 12—30 cm. long, 4—10 cm. broad, infundi buliform, pale green, purple striate or spotted; wings narrow, shortly or not ciliate, or reduced to strong ridges; lid 4—10 cm. long, 3—8 cm. broad, ovate-oblong, without glabrous, within with 2 parallel patches of

glands between margin and middle; spur 10—30 mm. long tapered; pitcher within from mouth to upper third or fourth of length glaucous or glauco-purple, smooth, shining and richly glandular below. *Inflorescence* 15—30 cm long, white tomentose, later subglabrous; raceme densely flowered; pedicels uni- rarely bi-florous. *Sepals* 4, ovate or elliptic, tomentose without, crimson and densely glandular within. *Staminal column* equal to sepals, glabrous, purple; anthers 20—16 irregularly biseriate. *Ovary* oblong, white-tomentose; stigma four-lobed, peltate. *Capsule* 2—4 cm. long, sparingly tomentose. *Seeds* 15—20 mm. long, testa round, embryo brown, wings white. Korthals Verh. Nat. Ges. Bot. 35 (1839); Hook. in Bot. Mag. t. 4285 (1847); Lemaire in Fl. d. Serr. III t. 213, 214 (1847); Blume Mus. Bot. Lugd.-Bat. II. 9 (1852); Miq. Fl. Ind. Bat. 1. i. 1070 (1855); Van Houtte in Fl. d. Serr. XVI. 167 (1867); Hook. f. in DC. Prodr. XVII 96 (1873); Masters in Gard. Chron. II (1882) 424 tt. 69, 70; Hook. f. Fl. Br. Ind. V. 69 (1890); Macfar. in Engl. Pfl.-reich IV. iii. 61. *N. Sanderiana*, Burbidge Flora and Sylva II. 113 (1904), III 280 (1905) with col. pl.

MALACCA: on Mount Ophir, *Maingay* K.D. 2751!. SINGAPORE: *Jack*; *Wallich* 2242!; *Beccari*!; *T. Anderson* 162!; at Bukit Mandi, *Ridley*!; at Tampinis, *Goodenough* 4692!; at Kranji, *Ridley*, 3371!; at Changi, *Ridley* 4693!; Chanchu Kang, *King's Collector* 5629! at 300 ft. alt.—DISTRIB. Malaya, Sumatra, Borneo, Banka.

10. *NEPENTHES PHYLLAMPHORA*, Willd. Sp. Pl. IV. p. 2, 874 (1805). A branched, climbing or prostrate, bright green shrub. *Stem* 5—8 m. long, cylindric, sparingly stellate-pubescent when young at length glabrous, lower internodes short, upper elongate to 7 cm. *Leaves* 15—45 cm. long, 6—8 cm. broad; thin, herbaceous, petiolate; petiole 4—15 cm. long, with vertical wings, half-amplexicaul at base gradually expanded upward into the lamina; lamina elliptic-oblong, above and below glabrous or sparsely puberulous along lower rib surface, margins dentate-ciliate; longitudinal veins 6—10, commonly 7 or 8, united by many oblique parallel nerves; tendril 15—25 cm. long, thickened upwards toward pitcher; pitchers 8—15 cm. long, 2—3 cm. broad, monomorphic, subcylindric, slightly ventricose in lower half, contracted toward mouth above, pale green to reddish-green, slightly puberulous, wings narrow, ciliate or not in lower, reduced to ridges in upper pitchers; peristome cylindric, orifice circular to elliptic, transverse or slightly oblique, nearly uniform, pale green to purple; lid 2—4 cm. nearly orbicular with circular scattered

glands within; inner pitcher surface glaucous- or reddish-green over upper half, shining and with many distinct circular glands over lower half. *Inflorescence* 20—35 cm. long; peduncle and raceme stellate pubescent; pedicels 2—1-flowered below, 1-flowered above. *Sepals* 4, elliptic tomentose without, abundantly glandular within. *Staminal column* glabrous, anthers 20—16, biseriate, convolute. *Ovary* ovate, white-tomentose, style short with 4-grooved stigmas. *Capsule* 18—20 mm. long. *Seeds* 15—16 mm. long, delicate. Jack in *Comp. Bot. Mag.* I. 271; Korthals Verh. Nat. Gesch. Bot. (1839) 28; Blume Mus. Bot. Lugd.-Bat. II. 7; Miq. Fl. Ind. Bat. I. i, 1069; Hook. f. in *Trans. Linn. Soc.* XXII 422, in *DC. Prod.* XVII 97, and *Fl. Br. Ind.* V. 69; Beccari Malesia I. 213 and III. 11; Hemsley in *Bot. Mag.* t. 8067; Macfar. in *Engl. Pfl.-reich* IV. iii. 63. *Phyllamphora mirabilis*, Lour. Fl. Cochinch. 606. *N. macrostachya*, Blume and *N. fimbriata*, Blume Mus. Bot. Lugd.-Bat. II. 7; Miq. Ill. Fl. Archip. Ind. 3 t. 2, 5 t. 6. *N. distillatoria*, Wall. Cat. 2244; Aiton Hort. Kew. ed. 2, V. 420. *N. O'Brieniana*, Rodigas in Ill. Hort. (1890) 109.

KEDAH, at Langkawi Island, *Mahomed Hanif*!. PENANG: on Mount Elvira, *Curtis*!. at Waterfall, *Curtis*!. PROV. WELLESLEY: at Tassek Glugor, *Curtis*!. PERAK: at Ulu Bubong, *King's Collector* 10631! at 400—600 ft. alt.; at Telok Bahang, *Curtis*!. SINGAPORE: *Wallich* 2244!; at Changi, *Ridley*.—DISTRIB. China and Cochin China, Malaya, Sumatra, Borneo and N. Guinea?, N. Australia.

Family XCVIII. PIPERACEAE.

By C. DE CANDOLLE.

Herbs or shrubs or small trees, growing on the soil or epiphytic, parenchyma with aromatic or resiniferous cells. Stem and branches containing either (in *Peperomia*) a system of distinct fibrovascular bundles with limited centrifugal growth, disposed in more or less concentric rows and anastomosing together in the nodes; or (in *Piper*) two fibrovascular systems, one of which is composed of peripheric bundles with unlimited centrifugal growth, the other of intramedullary bundles with limited centrifugal growth; the bundles of both systems anastomosing together in the nodes. *Leaves* simple, entire, exstipulate in *Peperomia*, stipulate in *Piper*. *Inflorescence* spiciform. *Flowers* very small, 1—2-sexual. *Perianth* 0. *Stamens* 1—10, hypogynous or connate with the ovary at its extreme base, rarely higher. *Ovary* 1-celled, a single terminal orthotropous ovule.

Fruit (a berry) indehiscent. *Seed* adherent to the endocarp; embryo-sac persistent at the apex of a copious perisperm, including the dicotyledonous embryo and a scanty endosperm; radicle superior.

Stigma globular or rarely bilobed, very small; fruit minute,
0.5—2 mm. long. Leaves exstipulate 1. *PEPEROMIA*.
Stigmas 2—6, very rarely a single globular stigma (so far
only in two species); fruit small, 3—11 mm. long.
Leaves stipulate 2. *PIPER*.

1. *PEPEROMIA*, Ruiz and Pavon.

Herbs, annual or perennial, usually succulent. *Leaves* exstipulate, alternate or (seemingly) opposite or verticillate. *Spikes* pedunculate, either solitary and inserted in the axils of fully developed leaves, or terminal, or inserted in the axils of imperfect leaves and then geminate or paniculate or umbellate, or very rarely epiphyllous. *Bract* very small, usually hypopeltate, seldom squamiform. *Flower* bisexual, sessile or subsessile, often sunk with its bract in a depression of the rachis. very rarely (only in two West Indian species) connate with its bract. *Stamens* 2, lateral, hypogynous; anthers extrorse, 2-celled, bivalvate when opening. *Ovary* free, formed by a single carpel; stigma globular or rarely bilobed, always very small and sometimes hardly visible; ovule with a single integument. *Berry* usually rounded at its base or more rarely contracted into a slender stipe.

1°. Leaves opposite or the upper ones ternate-quaternate.

a. Stem and leaves more or less pubescent.

Stigma inserted obliquely a little below the summit of the ovary; limb of leaf elliptic or obovate-elliptic, cuneate at the base, up to 4 mm. long .. 1. *P. dindigulensis*

Stigma terminal; limb of leaf obovate or rounded-obovate, acute or subacute at the base, 12.5—20 mm. long .. 2. *P. Wrayi*.

b. Stem and leaves glabrous.

Stigma terminal; limb obovate or elliptic-rhomboid, rounded at the apex, acute at the base, 26—40 mm. long .. 3. *P. portulacoides*.

2°. Leaves alternate.

a. Limb glabrous on both surfaces.

Stigma inserted obliquely a little below the summit of the ovary. Limb elliptic, cuneate at the base, obtuse at the apex, up to 40 mm. long .. 4. *P. Maxwelliana*.

Stigma terminal.

Berry globose, uniformly glandulose-asperulate. Limb rounded-ovate, cordate at the base, obtuse at the apex, up to 29 mm. long, and 31 mm. wide .. 5. *P. malaccensis*.

Berry covered with longitudinal glandulose-asperulate riblets. Limb deltoid-cordate, subobtusely acuminate at the top, up to 26 mm. long and 19 mm. wide 6. *P. pellucida*.

b. Limb densely hirtellous on both surfaces.

Stigma inserted obliquely a little below the summit of the ovary. Limb rounded-obovate, 23 mm. long,

14.5 mm. wide 7. *P. kotana*.

1. *PEPEROMIA DINDIGULENSIS*, Miq. Syst. Pip. 122, in Hook. Journ. Bot V. 549 and Ill. Pip. 19, t. 13. Erect, stem and branches puberulous. *Leaves* opposite or the terminal ternate, moderately long-petioled; limb membranous when dry, elliptic or obovate-elliptic, cuneate at the base, obtuse or subobtusate at the top, puberulous on both surfaces, 5-nerved; up to 45 mm. long and 38 mm. wide; petiole puberulous, about 8 mm. long. *Peduncles* axillary and terminal, about 8 mm. long, puberulous. *Spikes* 7—8 cm. long, filiform, glabrous; limb of bract rounded, subsessile at its centre; anthers elliptic; ovary emergent, obovate; stigma globular, glabrous, obliquely inserted slightly lower than the apex of the ovary. C. DC. in Prodr XVI. i. 442; Wight Ic. t. 1921; Hook. f. Fl. Br. Ind. V. 98 exclud. syn. *P. Thwaitesii*, C. DC. *P. Heyneana*, Wight Ic. t. 1922. *Piper ovalifolium*, Heyne in Wall. Cat. n. 6663 A. and B. (except lower specimen, vide Hook. f. l. c.).

PAHANG: top of the Kota Glanggi caves, *Ridley* 2346. SELANGOR: rocks at Batu caves, *Ridley*.—DISTRIB. India (Deccan Peninsula, rocks of Dindigul).

2. *PEPEROMIA WRAYI*, C. DC. in Records Bot. Survey Ind. VI. 1. (1917). Stem decumbent, puberulous, rooting at the nodes; branches erect, densely puberulous, nearly 1 mm. thick, angulose when dry, ramulose, up to 10.5 cm. long. *Leaves* opposite, petioled; limb puberulous at the margins on the upper surface, otherwise glabrous, obovate or the uppermost rounded-obovate, acute or subacute at the base, the lower up to 20 mm. long and 7—15 mm. wide, the uppermost 6 mm. in diam.; petiole densely puberulous, 4—6 mm. long. *Peduncles* terminal, glabrous, up to 12.5 mm. long. *Spikes* about 24 mm. long and 1 mm. thick, glabrous; limb of bract rounded with short central pedicel; anthers elliptic, filaments very short; ovary ovate, stigma terminal, glabrous. *Berry* globose, asperulate, nearly 1 mm. in diam., its base immersed in the rhachis.

PERAK: upper part of the valley of the Batang Padang, at 1500—2000 ft. altitude, on dead tree, *Wray* 1455.

3. *PEPEROMIA PORTULACOIDES*, A. Dietr. Sp. Pl. Ed. VI. I. 172 (1831). Herb: succulent, quite glabrous; branches erect from a creeping stem, up to 6 mm. thick, flattened when dry. *Leaves* opposite or the upper ones ternate-quaternate, petioled; limb membranous when dry, pellucid-dotted, obovate or elliptic-rhomboid, acute at the base, rounded at the top, 3-nerved; 26—40 mm. long and up to 26 mm. wide; petiole 5—12 mm. long. *Peduncles* axillary and terminal, 3—4 cm. long. *Spikes* up to 5 cm. long, filiform when dry; limb of bract round with a very short central pedicel; anthers subglobose; ovary turbinate, emergent; stigma terminal, punctiform, puberulous. Miq. Syst. Pip. 130 and in Hook. Lond. Journ. Bot. V. 550; C. DC. in Prodr. XVI. i. 443; Wight Ic. t. 1922; Hook. f. Fl. Br. Ind. V. 98. *P. Candolleana*, Miq. Syst. Pip. 130. *Piper portulacoides*, Lam. Ill. 82; Vahl. Enum. I. 350. *P. Trifolium* Herb. Willd. n. 737.

SELANGOR: rocks at Batu caves, *Ridley*.—DISTRIB. India (Travancore mountains, Courtallum), Bourbon, Mauritius.

4. *PEPEROMIA MAXWELLIANA*, C. DC. in Records Bot. Surv. Ind. VI. 1. (1912). Stem decumbent, rooting at the nodes; spiciferous branches erect, glabrous, nearly 1 mm. thick when dry. *Leaves* alternate, moderately long petioled; limb subcoriaceous and fuscous when dry, elliptic, obtuse at the top, cuneate at the base, 3-nerved, glabrous on both surfaces and very minutely ciliate at the margins near the summit, up to 40 mm. long and 20 mm. wide; petiole glabrous, 5 mm. long. *Peduncles* terminal and axillary, glabrous, 8—10.5 mm. long. *Spikes* glabrous, up to 5 cm. long, little less than 1 mm. thick, densiflorous; limb of bract orbicular, 0.5 mm. in diam., subsessile at its centre; ovary emergent, obovate; stigma glabrous, obliquely inserted slightly lower than the top of the ovary; bract and ovary reddish-punctulate when dry.

PERAK: Maxwell's hill, *Ridley* 5481.

5. *PEPEROMIA MALACCENSIS*, *Ridley* in Kew Bull. (1895) 185, ex C. DC. in Records Bot. Surv. Ind. VI. 2. Stems prostrate, succulent, glabrous, subangulose, rooting from the nodes, little more than 1 mm. thick when dry. *Leaves* alternate, moderately long petioled, glabrous; limb dark green or cupreous when living, fuscous and membranous when dry, rounded-ovate, the base not deeply cordate, the summit obtuse, 5-nerved, 29 mm. long and up to 31 mm. wide; petiole 12.5 mm. long. *Peduncles* terminal, nearly as long as the petiole, glabrous. *Spikes* 38 mm. long when flowering, glabrous;

limb of bract oblong-rounded with a central pedicel immersed with the flower in the rhachis; ovary globose, stigma terminal, minute, glabrous. *Berry* globose, asperulate, its base immersed in the rhachis, nearly 1 mm. in diam.

MALACCA: Batu Tiga, rocks in forest, *Derry* 80.

6. *PEPEROMIA PELLUCIDA*, Kth. in H. B. K. Nov. Gen. 1. 64 (1815); Kunth Syn. I. 117; Pl. Aeq. II. 53. Annual, erect, quite glabrous, about 30 cm. high, ramulose; branches pellucid when dry. *Leaves* alternate, petioled; limb membranous and pellucid when dry, deltoid-cordate, subobtusely acuminate, 7-nerved, up to 26 mm. long and 19 mm. wide; petiole 14.5 mm. long. *Peduncle* terminal, leaf-opposed, nearly as long as the petiole. *Spike* about twice as long as the leaf, filiform membranous when dry, glabrous; limb of bract round, subsessile at its centre; anthers rounded, filaments very short. *Berry* globose, mucronate at the apex, with longitudinal verruculose ribs; stigma terminal, puberulous. A. Dietr. Sp. Pl. Ed. VI. 1. 164; Miq. Syst. Pip. 79 and in Hook Lond. Journ. Bot. IV. 413; C. DC. in Prodr. XVI. i. 402; Dahlst. Stud. S. and C. Amerik. Peper. 16, t. 1, fig. 1. *Piper pellucidum*, L. Sp. I. 163; J. Hill Veg. Syst. XXVI. t. 18, fig. 3; Aublet Hist. Pl. Guy. I. 21; Lam. Ill. 82; Vahl Enum. I. 346; Willd. Sp. Pl. I. 163; Spreng. Syst. Veg. 117.

Naturalized. PENANG: Common in the town, *Curtis* 1968. PERAK: *Wray* 1769. TRINGGANU, Bundi, *Rostado*. SINGAPORE: Deschamps; shady places, *Kunstler* 211.—DISTRIB. Trop. America, West Indies, Trop. Africa, Malayan Archipelago, India (Poona, *Cooke*; Andamans *King's Coll.* 11891).

7. *PEPEROMIA KOTANA*, C. DC. in Records Bot. Surv. Ind. VI. 2 (1912). Stem erect from a creeping base, densely hirtillous, about 1 mm. thick when dry. *Leaves* alternate, petioled; limb densely hirtillous, on both surfaces, rounded-obovate, 23 mm. diam. in the inferior leaves; elliptic, subacute at the base, rounded at the top, 23 mm. long, 14.5 mm. wide, 5-nerved in the superior leaves; petiole densely hirtillous, 10 mm. long in the inferior, 4 mm. long in the superior leaves. *Peduncle* terminal. *Spike* 27 mm. long, 1 mm. thick, glabrous, densiflorous; limb of the bract obovate, subsessile at its centre, brown-dotted when dry; anthers rounded; ovary emergent, obovate; stigma punctiform, glabrous, inserted obliquely and slightly lower than the top of the ovary.

PAHANG: Kota Glanggi, *Ridley*.

This species is very much like *P. convexa*, Miq., from which it differs by its obovate bract.

2. PIPER, L. (*pro parte*).

Shrubs or small trees, with swollen nodes. *Leaves* provided with stipules inserted on the margins of the petiolar sheath. *Spikes* pedunculate, usually oppositifolious, rarely axillary or condensed at the top of an axillary ramulet. *Flowers* unisexual or bisexual, sessile or rarely pedicellate. *Stamens* 2—6, rarely 1 or 8—10, hypogynous or connate with the ovary at its base, rarely higher; anthers deciduous, usually 4-valvate, rarely 2-valvate when opening, slits lateral, filaments persistent. *Ovary* free or partly imbedded in and connate with the rhachis; stigmas 2—6, very rarely a single terminal stigma.

Key to the Sections.

- A. Flowers sessile.
 - a. Spikes oppositifolious.
 - Bracts not connate SECTION I, EUPIPER.
 - Bracts connate at their lower and upper ends SECTION II, MULDERA.
 - b. Spikes condensed at the top of an axillary ramulet SECTION III, HECKERIA.
- B. Flowers pedicellate SECTION IV, ENCKEA.

SECT. I.—EUIPER C. DC. in *Prodr.* XVI. 1. 339, *emend.*

Spikes oppositifolious. *Bracts* not connate, hypopeltate, with a central pedicel or sessile or adnate to the rhachis and then free only at their ends and lateral margins. *Flowers* sessile, unisexual or rarely bisexual. *Stamens* 2, lateral, rarely 3—4 of which 2 are lateral. *Ovary* free or partly imbedded in and concrescent with the rhachis.

Key to the species of the Malayan Peninsula.

(All dioecious, except ns. : 7, 25, 32, 46, 48 which are polygamous.)

N.B.—All measurements and other foliar characters indicated in this key and in the diagnoses always refer to the leaves of the upper part, that is to say of the flowering part of branches. The width of leaves is taken from their widest portions.

- A. Berry not stipitate. (Nos. 1—29).
 - 1°. Bract not adnate to the rhachis, rounded or obovate, with central pedicel or sessile. (Nos. 1—23).
 - a. A single orbicular or globose stigma, berry partly imbedded in the rhachis. (Nos. 1 2).
 - Δ Leaf entirely glabrous. Limb oblong-elliptic-lanceolate, 9.5—11.5 cm. long, 2—3 cm. wide .. 1. *P. globulistigma*

- Δ Δ Leaf more or less pubescent, hairs ramulose. Limb oblong-elliptic-lanceolate, up to 12 cm. long, and 5 cm. wide 2. *P. ramipilum*.
 b. Stigmas 3-4-5. (Nos. 3-23).
 Δ Ovary and berry prolonged upwards into a style. (Nos. 3 7).
 × Limb multinerved.¹ Berry partly imbedded in the rhachis.
 Leaf entirely glabrous. Limb elliptic-lanceolate, 8.5-9.5 cm. long, 3.2-3.5 cm. wide.. .. 3. *P. rufispicum*.
 × × Limb multiplinerved.² Ovary and berry free.
 - Leaf entirely glabrous.
 + Bract orbicular; spike much shorter than the leaf.
 Limb oblong-elliptic-lanceolate, 11-13 cm. long, 3-4 cm. wide 4. *P. penangense*.
 ++ Bract obovate; spike nearly as long or longer than the leaf.
 Limb elliptic-lanceolate, 12-13.5 cm. long, 5-5.7 cm. wide 5. *P. conibaccum*.
 Limb elliptic-lanceolate, 15-22 cm. long, 6-10.5 cm. wide 6. *P. magnibaccum*.
 -- Leaf glabrous above, pubescent underneath, young branches retrorsely hirsute.
 Limb elliptic, 11-15 cm. long, 5.5-7 cm. wide .. 7. *P. stylosum*.
 Δ Δ Ovary and berry without styles. (Nos. 8-23).
 ○ Ovary and berry free. (Nos. 8-18).
 × Limb multinerved. (Nos. 8, 9).
 - Leaf entirely glabrous. Limb oblong-ovate, acutely acuminate, the base rounded on one side, attenuate on the other side 8. *P. flavibaccum*.
 -- Leaf hirsute on the petiole and base of the limb.
 Limb oblong-ovate, acutely acuminate, the extreme base half-cordulate.. .. . 9. *P. minutum*.
 × × Limb multiplinerved. (Nos. 10-7).
 - Limb entirely glabrous. (Nos. 10-5).
 + Base of the limb rounded on both sides or at least on one side.
 ● Base of the limb equilateral or nearly so. Limb ovate, acutely acuminate, 11.5 cm. long, nearly 5 cm. wide 10. *P. semangkoanum*.
 ●● Base of the limb distinctly inequilateral .. 11. *P. gymnocladum*.
 Limb oblong-elliptic, acutely acuminate, up to 18.8 cm. long 12. *P. boehmeriae-folium* (forma).

¹ That is to say with all the main nerves free from the base.

² That is to say with some of the main nerves issuing from the central nerve, the others free from the base.

- + + Base of the limb attenuate on both sides.
- Spiciferous branches glabrous
 - Limb 7.6 cm. long, ovate-lanceolate. Peduncle
much longer than the petiole 13. *P. lonchites*.
 - Limb 16 cm. long, elliptic-lanceolate. Bract rounded .. 14. *P. gymnophyllum*.
 - Limb 15—22 cm. long, elliptic-lanceolate. Bract
obovate 6. *P. magnibaccum*.
- Spiciferous branches puberulous. Limb up to
8.5 cm. long, ovate-lanceolate 15. *P. puberuli-
rameum*.
- Limb glabrous above, pubescent underneath. (Nos.
16, 17).
- + Base of limb cordate and equilateral. Limb up to
22 cm. long, rounded ovate, acutely acuminate .. 16. *P. velutinervium*.
- + + Base of limb rounded on both sides and equilateral.
Limb about 9 cm. long, ovate, acutely acuminate .. 17. *P. sarmentosum*.
- + + + Base of limb rounded on one side, attenuate on
the other. Limb up to 12 cm. long, oblong-
elliptic-lanceolate 12. *P. boehmeriae-
folium*, var. *lanatum*.
- x x x Limb penninerved,¹ entirely glabrous, attenuate
at the base.
Limb oblong-elliptic-lanceolate, 12—15 cm. long .. 18. *P. Scortechinii*.
- ○ Ovary and berry partly imbedded in the rhachis.
(Nos. 19—23).
- x Limb multinerved, glabrous above puberulous
underneath on the nerves. Base of limb cordate
and equilateral. Limb oblong-ovate acutely
acuminate 19. *P. longum*.
- x x Limb multiplinerved.
- Limb entirely glabrous.
- + Berry glabrous.
Limb ovate or rounded-ovate, subacutely acuminate,
up to 5 cm. long 20. *P. subfragile*.
- Limb ovate, acutely acuminate, 13.5 cm. long,
7 cm. wide 21. *P. minutistigmum*.
- + + Berry tomentose. Limb ovate or rounded-ovate,
acutely acuminate, 10—13 cm. long .. 22. *P. Belle*.
- Limb glabrous above, pubescent underneath, amply
ovate, acutely acuminate, up to 22.5 cm. long,
the base cordate and inequilateral .. 23. *P. febrifugum*.
- 2°. Bract adnate to the rhachis, obovate-oblong or
elliptic-oblong or oblong. (Nos. 24—29).
- a. Bract free at both ends and along its lateral and
thinned margins. (Nos. 24—28).

¹ That is to say with all its main lateral nerves issuing from the central nerve.

- Limb entirely glabrous, multiplinerved, the base attenuate on both sides. (Nos. 24—27).
- + Bract quite glabrous. (Nos. 24—26).
Limb elliptic, acutely acuminate, nearly 10.5 cm. long, red underneath 24. *P. porphyrophyllum*.
- Limb elliptic-lanceolate, acutely and rather long acuminate, 11—15 cm. long, 5—9 cm. wide.
Anthers rounded 25. *P. nigrum*.
- Limb elliptic-lanceolate, acutely and rather long acuminate, 13—15 cm. long and 4.5—5.5 cm. wide. Anthers ovate 26. *P. flavispicum*.
- + + Bract minutely puberulous on the back and ciliate.
Limb elliptic-lanceolate, acutely acuminate, 7.5—10 cm. long 27. *P. longicaule*.
- Limb glabrous above, puberulous underneath, penninerved.
Limb elliptic, acutely acuminate, 12 cm. long, the base rounded on one side.. .. 28. *P. kotanum*.
- b. Bract free at both ends, its lateral margins not thinned.
Limb elliptic, acutely acuminate, about 10.5 cm. long, 4.5—6.5 cm. wide, the base rounded on both sides 29. *P. leptoneura*.
- B Berry stipitate. Nos. 30—48).
- 1°. Bract rounded. (Nos. 30—32).
- x Limb multiplinerved.
- Limb entirely glabrous, 10—13 cm. long. Bract glabrous.
Limb ovate, acutely acuminate, cordate at the base 30. *P. dindingsanum*.
Limb lanceolate 31. *P. caninum* var. *glabrum*.
- Limb glabrous above, pubescent underneath, 9—11.5 cm. long. Bract pubescent.
Limb ovate-oblong, acutely acuminate, attenuate at the base 31. *P. caninum*.
- x x Limb penninerved, pubescent on both surfaces, elliptic-lanceolate, up to 17.5 cm. long .. 32. *P. malaccense*.
- 2°. Bract obovate or oblong-elliptic. (Nos. 33—48).
- x Limb multinerved, entirely glabrous.
Limb oblong-ovate, subobtusely acuminate, up to 9 cm. long 33. *P. selangorensis*.
- x x Limb multiplinerved. (Nos. 34—42).
- Limb entirely glabrous. (Nos. 34—41).
- Bract not adnate to the rhachis, with a central pedicel or sessile. (Nos. 34—37).
- Base of limb rounded on one side, attenuate on the other side.
Limb oblong-ovate acutely acuminate, up to 12.5 cm. long 34. *P. subalbicans*.

- □ Base of limb attenuate on both sides and equilateral.
+ Limb 5-plinerved.
Limb subovate-elliptic-lanceolate, subacutely acuminate, 9—11·5 cm. long 35. *P. Curtisii*.
Limb oblong-elliptic, acutely acuminate, up to 10·5 cm. long 36. *P. paucistigmum*.
++ Limb 7-plinerved, elliptic-lanceolate, acutely acuminate, up to 7·5 cm. long 37. *P. Maxwellianum*.
● ● Bract adnate to the rhachis and free only at the margin. (Nos. 38—42).
□ Base of limb cordate or cordulate, or obtuse.
Limb ovate, subobtusely acuminate, 9 cm. long, 3·8—4·4 mm. wide 38. *P. pedicellosum*.
Limb oblong-ovate or subobovate-oblong, acutely attenuate, about 25 cm. long, 11 cm. wide .. 39. *P. ribesionides*.
Limb oblong-elliptic, acutely and rather long acuminate, about 10·5 cm. long, 42 mm. wide .. 40. *P. mucronatum*.
□ □ Base of limb attenuate and equilateral.
— Limb glabrous on both sides.
Limb elliptic-lanceolate, acutely acuminate, 11·5 cm. long, 6 cm. wide 41. *P. longibracteum*.
-- Limb glabrous above, pubescent underneath.
Limb elliptic-lanceolate, acutely acuminate, up to 14·5 cm. long, 6 cm. wide 42. *P. xanthocarpum*.
× × × Limb penninerved. Bract obovate or oblong. (Nos. 43—48).
— Limb entirely glabrous. (Nos. 43, 44).
● Base of limb rounded on one side, attenuate on the other side.
Limb oblong-elliptic, acutely acuminate, 13—16 cm. long, 4·8—7 cm. wide 43. *P. larutanum*.
● ● Base of limb attenuate on both sides.
Limb elliptic-lanceolate, acutely acuminate, 13-16 cm. long, 4·8—7 cm. wide 44. *P. collinum*.
-- Limb pubescent on both surfaces. Bract shortly pedicellate. (Nos. 45—48).
● Base of limb cordate or cordulate.
Limb oblong-elliptic, shortly and subacutely acuminate, up to 17 cm. long and 7 cm. wide .. 45. *P. muricatum*
forma peninsularis.
Limb oblong acutely acuminate, 20·8—33·8 cm. long, 4·2—5·6 cm. wide 46. *P. protractum*.
● ● Base of limb rounded and slightly inequilateral.
Limb subobovate-elliptic, acutely acuminate, stipe hirtellous 45. *P. muricatum*,
forma pilistipes.
● ● ● Base of limb rounded on one side, attenuate on the other side.

- Limb obovate-oblong, acutely acuminate, 20 cm.
long, up to 7 cm. wide 47. *P. bipedale*.
- Base of limb attenuate on both sides and equilateral.
Limb lanceolate-elliptic, acutely acuminate, nearly
25 cm. long, 12 cm. wide.. .. 48. *P. Ridleyi*.
- C Ovary and berry unknown. (Nos. 49—60).
- 1°. Bract not adnate to the rhachis, rounded or obovate
with a central pedicel or sessile. (Nos. 49—58).
- × Limb multiplinerved. (Nos. 49—57).
- Limb entirely glabrous. (Nos. 49—55).
- Base of limb rounded on both sides and slightly
inequilateral.
- Bract glabrous.
Limb ovate, acutely attenuate, up to 16.5 cm. long,
9 cm. wide 49. *P. nigrantherum*.
Limb oblong-ovate, acutely acuminate, about 9 cm.
long, 4 cm. wide 50. *P. filipes*.
- Bract pubescent. Limb oblong-elliptic, shortly and
obtusely attenuate, up to 9.5 cm. long, 3.5 cm.
wide 51. *P. rufibracteam*.
- Base of limb rounded on one side, attenuate on
the other side.
Limb elliptic-oblong, acutely and rather long
acuminate, 12.5 cm. long, 4.5 cm. wide .. 52. *P. Kunstleri*.
- Base of limb attenuate on both sides.
- Bract rounded.
Limb elliptic-lanceolate, equilateral at the base,
8.5 cm. long, 2.6 cm. wide 53. *P. curtispetiolum*.
Limb elliptic-oblong, nearly equilateral at the base,
up to 15 cm. long and 4 cm. wide 54. *P. erecticaule*.
- Bract subobovate-elliptic.
- Limb elliptic-lanceolate, inequilateral at the base,
14.5 cm. long, 4 cm. wide 55. *P. eucalyptolum*
bum.
- Limb glabrous above, pubescent underneath.
Base of limb cordate. Limb rounded-ovate,
obtusely acuminate, up to 15 cm. long, 14 cm.
wide 56. *P. subrubripicum*.
- Limb pubescent on both surfaces.
Base of limb attenuate on both sides and equilateral.
Limb oblong-ovate-lanceolate, up to 10.5 cm. long,
3.5 cm. wide 57. *P. longamentum*.
- × × Limb penninerved, entirely glabrous. Base of limb
attenuate on both sides.
Limb subsessile, subobovate-elliptic-oblong, acutely
acuminate, up to 19 cm. long, 5 cm. wide .. 58. *P. subsessilimum*
bum.

- 2°. Bract adnate to the rhachis, oblong or obovate-oblong, free at both ends and at its lateral margin. (Nos. 59, 60).
 Limb entirely glabrous, multiplinerved, the base rounded or subrounded on both sides.
 Anthers obovate. Limb elliptic, acutely acuminate, 14 cm. long, 9 cm. wide 59. *P. obovatherum*.
 Anthers reniform. Limb oblong-ovate, acutely acuminate, up to 18 cm. long and 6 cm. wide .. 60. *P. argyrites*.
 D. Inflorescence unknown. 61. *P. clypeatum*.

1. *PIPER GLOBULISTIGMUM*, C.DC. in Records Bot. Surv. Ind. VI. 3 (1912). Branches glabrous, light brown when dry, the spiciferous up to 1 mm. thick; collenchyma continuous, not libriform; no periphery lysigenous canal; many dark brown cells in bark and pith. *Leaves* shortly petioled, glabrous; limb rigid and opaque, 9.5—11.5 cm. long and 2—3 cm. wide, oblong-elliptic-lanceolate, acutely and rather long attenuate, the sides of the base unequally long, the shortest tapering, the longest rounded; penninerved, the central nerve emitting on each side 3 alternate ascendent nerves, the uppermost from 24—36 mm. above the base; petiole about 5.5 mm. long, 2 of which between the side of the limb, sheath basal. *Peduncle* glabrous, 26 mm. long. *Spike*: ♀ cylindric, 52 mm. long and 1 mm. thick when ripe; rhachis densely velutino-puberulous; bract glabrous, its limb orbicular, rigid, 1 mm. in diam. with a very short central pedicel. *Berry* partly imbedded in the rhachis, its upper free portion rounded and densely velutino-puberulous; a single stigma, globular and very small.

PERAK: *Scortechini*!

2. *PIPER RAMIPILUM*, C. DC. in Records Bot. Surv. Ind. VI. 3 (1912). Creeper, up to 9 m. long. Branches pubescent when young, soon glabrous, the spiciferous 2 mm. thick drying brown; hairs ramulose in the female but not so in the male; collenchyma continuous, not libriform; a single central lysigenous canal. *Leaves* shortly petioled; limb rigid-membranous when dry, subpellucid-dotted, up to 12 cm. long and 5 cm. wide, glabrous above, pubescent on the nerves underneath, the hairs ramulose; ovate elliptic, acutely acuminate, the base cordulate and slightly inequilateral; 7-plinerved, the central nerve emitting 2 ascendent alternate nerves, the uppermost from about 32 mm. above the base, and having on each side of it 2 nerves free from the base, the external more arcuate and much shorter than the others; petiole densely pubescent, 8 mm. long, of

which 2 mm. between the sides of the limb, sheath prolonged up to the middle of the petiole; stipules glabrous, confluent in an obtuse apex. *Peduncle* sparingly pubescent, 20—24 mm. long, slender. *Spike*: ♂ about 7.8 cm. long, up to 2 mm. thick, attenuate at the top; rhachis glabrous; bract glabrous, its limb rounded 1 mm. in diam; stamens 2, anthers elliptic, 2-valvate: ♀ 10.5 cm. long and a little over 2 mm. thick when ripe, obtuse at the top; rhachis and bract as in the male; ovary glabrous, its base partly imbedded in the rhachis; a single minute orbicular stigma. *Berry* free except at its extreme base, globose, about 1 mm. in diam., orange or dark-yellow when living, black when dry.

PENANG: at Balik Pulau at 800—1000 ft. alt., *Curtis* 792; *Kunstler* 1481; *Deschamps*. PERAK: at Gunong Bulang, on trees, *King's Collector* 270; at Gunong Keledang, *Ridley* 9582; at Larut, *King's Collector* 3574; JOHORE: at Bukit Saya, *Ridley* 11022.

3. *PIPER RUFISPICUM*, C. DC. in *Records Bot. Surv. Ind.* VI. 4 (1912). Branches glabrous, light brown when dry, the spiciferous about 1 mm. thick; collenchyma in distinct laterally widened bundles, its inner zone libriform; a central and several peripheric lysigenous canals. *Leaves* glabrous; limb rigid and opacous, 8.5-9 cm. long and 3.2—3.5 cm. wide, elliptic-lanceolate, acutely attenuate, the base slightly inequilateral, attenuate on one side, sub-attenuate on the other side; 6-nerved, 3 nerves on one side and 2 on the other side of the limb. *Peduncle* glabrous, 13 mm. long. *Spike*: ♀ cylindric, rounded at the top, 5.7 cm. long, 2.6 cm. thick; rhachis rufo-tomentose; bract suborbicular, emarginulate at the top, minutely glandulose on both surfaces, sessile at its centre, 1 mm. in diam. *Berry* deeply imbedded in the rhachis, with a free conic and slender style about 1.5 mm. long; stigmas 4, short, ovate-acute.

PERAK: at Ijuk, *Scortechini* 1177.

4. *PIPER PENANGENSE*, C. DC. in *Prod.* XVI. i. 353 (1869). Erect, about 2 ft. high. Branches glabrous, fuscous when dry; the spiciferous nearly 2 mm. thick; collenchyma in distinct, laterally much widened, bundles and not libriform; a single central lysigenous canal. *Leaves* glabrous, shortly petioled; limb membranous when dry, minutely pellucid dotted, 11—13 cm. long, 3—4 cm. wide, oblong-elliptic-lanceolate, acutely acuminate, the base equilateral, acute or nearly so; 7-plinerved, the central nerve emitting 2 ascendent alternate nerves, the uppermost from about 18 mm. above its base,

and having on each side of it 2 lateral ascendent nerves free from the base; petiole 4—6 mm. long, sheath basal. *Peduncle* glabrous, about 15 mm. long. *Spike*: ♀ ovate-globose, nearly 4—6 mm. long, rhachis pilose; bract glabrous, orbicular, subsessile, 1·5 mm. in diam.; ovary free, glabrous, ovate, with an elongated style and 3—4 ovate-acuminate stigmas. *Berry* sessile, globose, about 3·5 mm. long with its slender style.* Hook f. Fl. Brit. Ind. V. 88 *Chavica penansis*, Miq. Syst. Pip. 279, Illustr. 45. t. 44.

PENANG: *Wallich* 6642 B. (in Herb. Berol), 6644 B. (in Herb. Hook.); Ulu Selama, *Wray* 4170. PERAK: at Gunong Inas, *Scortechini*; *Wray* 4087.

5. *PIPER CONIBACCUM*, C. DC. in Records Bot. Surv. Ind., VI. 4 (1912). Branchlets glabrous, the spiciferous 4 mm. thick, 6—7-costellate, the riblets membranous; collenchyma in distinct and laterally widened bundles, not libriform; a single central lysigenous canal, abundant yellow cells in bark and pith. *Leaves* shortly petioled, glabrous; limb firm when dry, 12—13·5 cm. long, 5—5·7 cm. wide, elliptic-lanceolate, subacutely acuminate, the base equilateral, acute; 7-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from 20—30 mm. above the base, and having on each side of it 2 ascendent nerves free from the base; petiole 10 mm. long, sheath basal. *Peduncle* as long as the petioles. *Spike*: ♀ nearly 40·3 cm. long; rhachis glabrous; bract glabrous, its limb obovate, attenuate in its lower part, 2 mm. long; ovary free, attenuate into a conic style; stigmas 3—5, more rarely 5 and sometimes 2, linear. *Berry* glaucescent when dry, its style 7 mm. long.

SELANGOR: at Semangko, *Ridley* 17056.

6. *PIPER MAGNIBACCUM*, C. DC. in Records Bot. Surv. Ind. VI. 5 (1912). Scandent. Branches glabrous, drying brown, the spiciferous up to 6 mm. thick and costellate; collenchyma in distinct laterally widened bundles, not libriform; a single central lysigenous canal. *Leaves* moderately long petioled, glabrous; limb subcoriaceous when dry, 15—22 cm. long, 6—10·5 cm. wide; elliptic-lanceolate, acutely acuminate, the base acute and equilateral; 7—9-plinerved, the central nerve emitting 2 opposite ascendent nerves from 20—26 mm. above the base and having on each side of it 2—3 ascendent nerves free from the base, the external much shorter than the others; petiole about 20 mm. long, sheath basal. *Peduncle* nearly as long as the petiole, glabrous, 2 mm. thick when dry. *Spike*: ♀ about

21 cm. long, rhachis glabrous; bract glabrous, its limb obovate, up to 3 mm. long, more or less prolonged and lacerate at its lower end, widely sessile; ovary free, glabrous, ovate attenuate at the top; stigmas 3—4, linear, acute and recurved. *Berry* sessile, globose and acuminate at the top, black when dry.

PERAK: Maxwell's hill, alt. 4000 ft., September, *Curtis* 2046; at Thaiping, March, *Ridley* 2963, 5480; at Larut, rare, growing closely to the stem of a tree in dense jungle, *King's Collector* 6369; at Maxwell's hill, alt. 3800 ft, Wray 4239. SELANGOR: Semangko pass, April, *Ridley* 15569.

This species will probably, when the male is known, have to be placed in Section SARCOSTEMON perhaps as a form of *P. Korthalsii* Miq. with larger and multinerved leaves, longer spikes and bracts not adnate.

7. PIPER STYLOSUM Miq. in Ann. Bot. Mus. Lugd.-Bat. 1. 139 (1863-64). Erect, 8-24 in. high. Branches densely and retrorsely ochraceo-hirsute, the spiciferous 2 mm. thick; collenchyma continuous, almost entirely libriform; a single central lysigenous canal; sclerosed cells abundant in the pith, less so in the bark. *Leaves* shortly petioled; limb membranous when dry, minutely pellucid-dotted, glabrous above, densely hirsute on the nerves and veins underneath; 11—15 cm. long, 5.5—7 cm. wide; elliptic, acutely acuminate, the base obtuse or subattenuate on one side, rounded and wider on the other side; 7-plinerved, the central nerve emitting 2 opposite or subalternate ascendent nerves, the uppermost from about 5.2 cm. above the base, and having on each side of it 2 ascendent nerves free from the base; petiole 6—8 mm. long, densely hirsute, sheath basal. *Peduncle* nearly equal to the petiole, densely ochraceo-hirsute. *Spike*: ♂ about 20 mm. long, 3 mm. thick, rhachis hirsute; bract glabrous, its limb orbicular, 1 mm. in diam. with a central pedicel; stamens 2, anthers oblong, 4-valvate, much shorter than the oblong filaments: androgynous spike cylindric, about 10 mm. long, white when living, rhachis hirsute; bract glabrous, subobovate-orbicular with a central pedicel; stamens as above; ovary free, glabrous; stigmas 3, ovate. *Berry* ovate, with a rather long conical style. C. DC. in Prodr. XVI. 1. 344. *P. rostratum*, Hook f. Fl. Br. Ind. V. 87 (not Roxb.). *P. birmanicum*, C. DC. in Prodr. XVI. i. 338.

DINDINGS: Gunong Tungul, *Ridley*. PERAK: Larut Hills Tea Gardens, *Curtis* 2049; Maxwell's Hill, *Ridley*; Gunong Batu Putih, alt. 4500 ft., Wray 283; at Kwala Wok, Wray 864; at Larut, *King's Collector*, 2491; in dense jungle, rich soil, 300—500 ft., 7791; *Scor-*

techini; Goping, *King's Collector* 415; Kampong Simpai, Batu Pahat, Lake and Kelsall 4015. SELANGOR: Gua Batu, Kajang, Kwala Lumpur, Ridley.—DISTRIB: Sumatra, Borneo.

8. *PIPER FLAVIBACCUM*, C. DC. in Records Bot. Surv. Ind. VI. 5 (1912). Branches glabrous, pale brown when dry, the spiciferous about 1 mm. thick; collenchyma continuous, sparsely libriform; a single central lysigenous canal. *Leaves* moderately long petioled, glabrous, limb rigid, membranous when dry, copiously pellucid-dotted; 10–11 cm. long, 2.8–3.5 cm. wide; oblong-ovate, acutely attenuate, the base inequilateral, attenuate on the shorter, rounded and wider on the longer side; 4-nerved, 2 lateral ascending nerves on one side of the base and a single on the other; petiole 10 mm. long with basal sheath. *Peduncle* glabrous, slender, nearly 20 mm. long. *Spike*: ♂ about 22 mm. long when flowering; rhachis hirsute; bract glabrous, its limb round, 0.5 mm. in diam. with a central short pedicel; stamens 2, anthers rounded, 4-valvate, much shorter than the oblong filaments: ♀ 20 mm. long when ripe. *Berry* free, globose, bright yellow when living, brown when dry, 2 mm. in diam.

PERAK: *Scortechini*; summit of Gunong Batu Putih, alt. 6700 ft., Wray 271, 331.

9. *PIPER MINIATUM* Bl. in Verh. Bat. Genoots. XI. 166 (1826) and Enum. Pl. Jav. 1. 65. Slender creeper, up to 6 m. long. Branches glabrous drying brown, the spiciferous nearly 1 mm. thick; collenchyma in distinct bundles, nearly entirely libriform; a single central lysigenous canal. *Leaves* very shortly petioled; limb rigid-membranous when dry, very minutely pellucid-dotted, 8–18 cm. long, 4–9 cm. wide, shining above, glabrous on both surfaces except at the base where the nerves are at first hirsute and soon glabrous; oblong-ovate, acutely acuminate, slightly inequilateral and very shortly half cordulate at the extreme base the longer side of which is auriculate; 5–7-nerved; petiole hirsute especially at the margins, about 4 mm. long, sheath basal. *Peduncle* glabrous, 26 mm. long, slender. *Spike*: ♂ 10.5 cm. long, up to 7 mm. thick, rhachis hirsute; bract glabrous, its limb round, 0.5 mm. in diam. with a central rather long pedicel; stamens 3, anthers elliptic, 2-valvate, filaments very short: ♀ 10.5–18 cm. long, 4 mm. thick, densely bacciferous, rhachis and bract as in the male; ovary free, glabrous, oblong; stigmas 3, very minute. *Berry* oblong-obovate, angulose, 2 mm. long, bright red when living, black when dry. C. DC. in Prodr. XVI. i. 354;

Hook. f. Fl. Br. Ind. V. 85. *P. auriculatum*, Bl. l. c. 171, Enum. 66. *P. glandulosum*, Opiz in Presl Reliq. Haenk. 158. *P. lanceolatum*, Roxb. Fl. Ind. 1. 159. *P. moluccanum*, Spreng. Syst. Veg. 1. 112. *Chavica miniata*, *macrostachya*, *lanceolata*, Miq. Syst. Pip. 234, 236, 264; Ill. Pip. 32, 33. t.t. 28, 29 and Fl. Ind. Bat. 1. ii. 440, 445.

PENANG : Wallich 6644; between rocks at 500 ft. altitude, King's Collector 1533; on rocks and trees, Curtis. PERAK : Waterfall, Curtis 2290; at 300 ft. altitude, Wray 1959; Larut, clings to trees in dense jungle, King's Collector 748; at 300-600 ft. in open jungle on trees in rocky localities, Kunstler 1925. MALACCA : Maingay K.D. 1327; at Bukit Benang, Derry 535, on Mt. Ophir, Derry 3152. Johore : Tanjong Kupang, Ridley 6426. SINGAPORE : at Toas, Ridley 4684.

10. PIPER SEMANGKOANUM, C. DC. in Records Bot. Surv. Ind. VI. 6 (1912). Glabrous in all its parts, spiciferous branches 1.5 mm. thick; collenchyma in distinct bundles, sparsely libriform; a central lysigenous canal; abundant blackish cells in the pith. Leaves shortly petioled; limb membranous when dry, 11.5 cm. long, 5 cm. wide; ovate, acutely acuminate, the base rounded and equilateral; 7-plinerved, the central nerve emitting 2 ascendent nerves from nearly 42 mm. above the base and having on each side of it 2 ascendent nerves free from the base; petiole 5 mm. long, sheath basal. Peduncle as long as the petioles. Spike: ♀ cylindric, black when dry, 8.5 mm. long, about 2 mm. thick; bract orbicular, subsessile at its centre; ovary free, stigmas 4, linear.

PERAK : Maxwell's Hill, Ridley. SELANGOR : Semangko pass, Ridley.

11. PIPER GYMNOCLADUM, C. DC. in Records Bot. Surv. Ind. VI. 6 (1912). Glabrous in all its parts; branches drying brown, the spiciferous up to 1.5 mm. thick; collenchyma libriform, in distinct bundles; a single central lysigenous canal. Leaves shortly petioled; limb firmly membranous when dry, up to 14.5 cm. long and 6.5 cm. wide, pellucid-dotted, ovate, shortly and acutely attenuate, the base rounded and inequilateral, wider and slightly longer on one side; 7-plinerved, the central nerve emitting on each side 2 ascendent nerves, the uppermost from 12.5 mm. above the base, and having on each side of it one subascendent short and thin nerve free from the base; petiole 10 mm. long, of which 2 mm. between the sides of the limb. Peduncle up to 22 mm. long. Spike: ♀ 16.8 mm. long,

2.1 mm. thick when flowering; bract rounded, 0.52 mm. in diam. with a short central pedicel; ovary free; stigmas 3-4, ovate-oblong, acute at the top. *Berry* sessile, globose, nearly 3 mm. in diam.

PERAK: Maxwell's hill, *Ridley* 5479.

12. PIPER BOEHMERIAEFOLIUM, Wall. Cat. 6654 (1828); C. DC., in Prodr. XVI. i. 348; Hook. f. Fl. Br. Ind. V. 85. *Chavica boehmeriaefolia*, Miq. Syst. Pip. 265; Ill. Pip. 41, t. 37.

Forma *b*, *glabrifolia*, C. DC. n.f. Erect, 0.9--1.2 m. high; branches glabrous, brown when dry, the spiciferous nearly 2 mm. thick; collenchyma continuous, not libriform; no lysigenous canal. *Leaves* moderately long petioled, glabrous; limb membranous when dry, minutely pellucid-dotted, up to 18.8 cm. long and 7.5 cm. wide, oblong-elliptic, acutely acuminate, the base inequilateral, rounded on the longest attenuate on the shortest side; penninerved, the central nerve emitting 5 nerves on the longest and 4 on the other side, the uppermost from 5 cm. above the base, the superior ascendent, the inferior subascendent and more curved; petiole about 6.5 mm. long, of which 2.2--4.4 mm. between the sides of the limb, sheath basal. *Peduncle* 4.4 mm. long, glabrous. *Spike*: ♂ about 28 mm. long, light yellow when flowering, later yellowish-red, rhachis hirsute; bract glabrous, its limb round, little less than 2.2 mm. in diam. with a short central pedicel; stamens 3, anthers reniform. 4-valvate, much shorter than the oblong filaments.

PERAK: Larut, at 500-1500 ft. altitude, in dense old jungle on rocky rich soil, *Kunstler* 2231, 2517.

Var. lanata, Hook. f. Fl. Br. Ind. l.c. *P. lanatum* Roxb. Fl. Ind. 1. 159, Ed. Carey and Wall. 1. 161; Wall. Cat. 6647; C. DC. in Prodr. 1. 341. *P. Cubeba*, Wall. Cat. 6645 (not Linn.). *P. lonchites*, Wall. Cat. 6644 in part. *P. javanicum*, C. DC. l.c. 343. *Cubeba lanata*, Miq. Syst. Pip. 298; Fl. Ind. Bat. 1. 2. 450. *C. Lowong* var. *quintuplinervis*, Miq. l.c. 298.

Ramlets densely hirsute: structure as in the type except that there are a few sclerosed cells opposite the medullary rays; limb 11--12 cm. long, 3.5--4 cm. wide, the upper surface hirsute principally on the nerves, undersurface and petiole densely hirsute. *Peduncle* up to 2 cm. long.

PENANG: *Wallich* 6647.

Var. glabra, Hook. f. l.c.; ramlets and leaves quite glabrous. Limb lanceolate, 4--5 in. long, up to 2 in. wide.

PAHANG: Tahan river, *Ridley* 2259, 2260; Ayer Panas, *Derry* 497. PERAK: in dense jungle, clinging to stems of trees, alt. 200-300 ft., *King's Collector* 4184; a small pepper 4-5 ft. long, fruit bright red when ripe, *Kunstler* 3411. PROV. WELLESLEY: at 100-300 ft. altitude, a long slender pepper, in dense jungle on trees, fruit red, *Kunstler* 1613; *Ridley* 14496.

Var. humilis C. DC. n. var.; shrub about 60 cm. high. Ramlets glabrous, petioles hirtellous; limb of leaves glabrous. Berry globose, nearly 1 mm. in diam.

PERAK: *Wray* 1949; *Scortechini*.

Var. angustifolia, Miq. ex Hook. f. l.c.; ramlets and leaves glabrous, lanceolate, 38-42 mm. long, up to 12.5 mm. wide.

MALACCA: *Maingay* K.D. 1333.

13. PIPER LONCHITES, Wall. Cat. 6644 (1828). Erect? Branches glabrous, smooth, drying brown, the spiciferous 1 mm. thick; collenchyma libriform in distinct bundles; a central and several peripheric lysigenous canals. Leaves shortly petioled, glabrous; limb membranous when dry, copiously and minutely pellucid-dotted, 7.6 cm. long and nearly 31 mm. wide, ovate-lanceolate, acutely attenuate, the base very slightly inequilateral, acute on the shortest, subrounded on the longest sides; 5-plinerved, the central nerve emitting 2 opposite ascendent nerves from nearly 6.3 mm. above the base and having on each side of it one ascendent nerve free from the base; petiole 3.3 mm. long, sheath basal. Peduncle glabrous, very slender, 13.5 mm. long in the male, 19-25 mm. long in the female. Spike: ♂ about 12.5 mm. long when flowering; rhachis hirsute; bract glabrous, rounded, subsessile at its centre, 1 mm. in diam.; stamens 3, anthers ovate, 4-valvate, shorter than the adult, oblong, filaments: ♀ about 29.5 mm. long and 2.5 mm. thick; rhachis and bract as in the male; ovary free, stigmas 3-4, lanceolate. Miq. Syst. Pip. I. 331; C. DC. in Prodr. XVI. i. 358; Hook f. Fl. Br. Ind. V. 40; non Röm. & Sch. Syst. Mant. I, 241 quod = *P. lanceolatum*, Roxb. = *P. miniatum*, Bl.

PENANG: *Wallich*. PERAK: *Scortechini*.

Forma *b*, C. DC. n.f. Branches as in the type; collenchyma almost entirely libriform, a single central lysigenous canal, a zone of sclerosed cells between the masses of phloem of the peripheric fibro-vascular bundles. Limb rigid when dry, the base slightly inequilateral, acute on both sides.

PENANG: *Hook. f. and Thoms.* PERAK: *Scortechini.*

Forma c, C. DC. n.f. *P. khasianum*, C. DC. in *Prodr.* XVI. i. 349. Branches slightly costellate; collenchyma libriform, in distinct bundles, a single central lysigenous canal, no sclerous cells.

PERAK: erect, *Ridley* 14497; *Scortechini* 619.

14. *PIPER GYMNOPHYLLUM*, C. DC. in *Records Bot. Surv. Ind.* VI. 6 (1912). Branches glabrous, dark brown and black-dotted when dry, the spiciferous up to 2 mm. thick; collenchyma partly or quite libriform in distinct bundles. *Leaves* moderately long petioled, glabrous; limb membranous when dry, black-dotted underneath, up to 16 cm. long and 5.5 cm wide, elliptic-lanceolate, acutely acuminate at the top, acute and slightly inequilateral at the base; 6-plinerved, the central nerve emitting 3 ascendent nerves of which 2 on one side, the uppermost from nearly 25.5 mm. above the base, and having on each side of it one ascendent short nerve free from the base; petiole up to 10.5 mm. long with basal sheath. *Peduncles* glabrous, 12.5 mm. long. *Spike*: ♀ nearly half as long as the limb; rhachis fulvescent-hirsute; bract glabrous, rounded, 1.5 mm. in diam., subsessile at its centre; ovary free, ovate, glabrous, stigmas 3-4, linear. *Berry* ovate, 4.2 mm. long, black when dry.

PERAK: Bujong Malacca, *Ridley* 9527.

Perhaps ♀ of *P. eucalyptolimbum*.

15. *PIPER PUBERULIRAMEUM*, C. DC. in *Records Bot. Surv. Ind.* VI. 7 (1912). Branches sparingly puberulous, drying brown, the spiciferous 1 mm. thick; collenchyma libriform in distinct bundles; a single central lysigenous canal. *Leaves* shortly petioled; limb rigid when dry, copiously pellucid-dotted, 7.5—8.5 cm. long and 2.5 cm. wide, glabrous on both surfaces, ovate-lanceolate, acutely attenuate, the extreme base acute and slightly inequilateral; 5-plinerved, the central nerve emitting 2 ascendent opposite nerves 8.5—10.5 mm. above the base and having on each side of it one ascendent nerve free from the base; petiole puberulous, 8.4 mm. long, of which less than 1 mm. between the sides of the limb, sheath basal. *Peduncles* slender, glabrous, 19 mm. long. *Spike*: ♀ about 3.5 cm. long when fruiting, rhachis densely hirsute; bract glabrous, its limb round, 1.5 mm. in diam., sessile at its centre; ovary free, glabrous; stigmas mostly 4, rounded and short. *Berry* sessile, globose-ovate, nearly 4.2 mm. long, drying black.

PENANG: Government hill, at 2000 ft. altitude, April, *Curtis* 2291; Balik Pulau, March, 8026. SUNGEI UJONG: *Curtis* 2083.

16. *PIPER VELUTINERVIVM*, C. DC. in Records Bot. Surv. Ind. VI. 7 (1912). Stem 0·9—2·4 m. high, its lower portion rooting from the nodes; spiciferous branches fulvescent-hirsute when young especially in the male, 4·2 mm. thick; collenchyma libriform in the male and not so in the female, in distinct laterally widened bundles; a single central lysigenous canal. *Leaves* long petioled; limb membranous when dry, copiously pellucid-dotted, glabrous above, velvety-hirtellous underneath on the nerves and veins; up to 22 cm. long and 21 cm. wide; rounded-ovate, acutely acuminate, the base equilateral and deeply cordate; 11-plinerved, the central nerve emitting 2 opposite ascendent nerves from nearly 6·3 mm. above the base, and having on each side of it 5 nerves free and divergent from the base; petiole fulvescent-hirsute and more densely so in the male, 11·5 mm. long, sheath prolonged up to 17 mm. above the base; stipules glabrous. *Peduncle* up to 16·8 mm. long, fulvescent-hirsute in the male, nearly glabrous in the female. *Spike*: ♂ 3·8 cm. long, 4·2 mm. thick; rhachis hirsute; bract glabrous, its limb rounded, 1 mm. in diam. with a central pedicel; stamens 2, anthers subglobose, 4-valvate, much shorter than the oblong and exsert filaments: ♀ up to 5·7 cm. long and 5·2 mm. thick; rhachis hirsute; bract rounded, 1·5 mm. in diam. with a central pedicel; ovary free, ovate, glabrous; stigmas 3, more rarely 4, ovate-oblong. *Berry* sessile, ovate-globose, yellow-red when living, black when dry, 4·2 mm. long.

PERAK: Larut, at 1800-2000 ft. altitude, in open jungle between rocks, August, *King's Collector* 2193, 2196.—DISTRIB. Sumatra.

17. *PIPER SARMENTOSUM*, Roxb. Fl. Ind. Ed. Car. & Wall. I. 162 (1820). Erect, 15—45 cm. high, "ramous at top, jointed and smooth, sarmentose shoots issuing in abundance from the top of the root and the lower part of the stem, by which the plant is quickly propagated to any extent" (Roxb. l. c.). Branches minutely puberulous, the spiciferous nearly 1 mm. thick; collenchyma not libriform, in distinct bundles; a single central lysigenous canal. *Leaves* moderately long petioled; limb membranous when dry, minutely pellucid-dotted, about 9 cm. long, and 4·2 cm. wide, glabrous above, minutely puberulous underneath on the nerves, ovate, acutely acuminate, the base rounded, equilateral or very nearly so; 7-plinerved, the central nerve emitting 2 ascendent nerves, the

uppermost from about 8.5 mm. above the base, and having on each side of it 2 nerves from the base, the inner ascendent, the outer sub-ascendent and much shorter than the others; petiole minutely puberulous, 6.3 mm. long, sheath basal. *Peduncle* very minutely puberulous, slender, up to 7.5 mm. long. *Spike*: ♂ about 25 mm. long, 2.5 mm. thick; rhachis hirsute; bract glabrous, its limb rounded, 0.5 mm. in diam. with a central pedicel: ♀ about 16.8 mm. long and 6.3 mm. wide when ripe; rhachis and bract as in the male; ovaries free and very densely condensed, glabrous; stigmas 3, ovate. *Berry* globose, sessile, black when dry, nearly 1 mm. in diam. Spreng. Syst. I. 117; Herb. Willd. n. 682; C. DC. in Prodr. XVI. i. 352. *Chavica sarmentosa*, Miq. Syst. Pip. 242, in Hook. Lond. Journ. Bot. IV. 433, in Fl. Ind. Bat. I. 2. 441, in Suppl. (Sumatra) 186, 473, in Pl. Jungh. I. 16, in Linn. XXI. 482; Wight Ic. t. 1929. *Peperomia sarmentosa*, A. Dietr. Sp. I. 161.

PENANG: Wallich. SINGAPORE: roadsides and hedges, *Deschamps*; damp and shady places, *Kunstler* 212.—DISTRIB.: Java, Borneo, Philippine Islands.

18. PIPER SCORTECHINII, C. DC. in Records Bot. Surv. Ind. VI. 8 (1912). Slender creeper, 4.5–6 m. long; branches glabrous, dark brown when dry, the spiciferous 1–1.5 mm. thick; collenchyma not libriform or partly so, in distinct laterally widened bundles; no periphery lysigenous canal; many rubescent cells in bark. *Leaves* shortly petioled, glabrous; limb membranous when dry, copiously and minutely pellucid-dotted, 12–15.5 cm. long, 3.6–4.8 cm. wide; oblong-elliptic-lanceolate, acutely acuminate, the base attenuate, its sides unequally long in the male, of same length in the female; penninerved, the central nerve emitting from nearly half of its length 7 ascendent nerves of which 3 on the shortest 4 on the longest side of the limb; petiole up to 12.6 mm. long of which 2.1–4.2 mm. between the sides of the limb; sheath prolonged a little above the base of the petiole. *Peduncle* glabrous, slender, 14.7–25.2 mm. long. *Spike*: ♂ 6.5 cm. long, nearly 1 mm. thick when flowering; rhachis hirsute; bract glabrous, rounded-subobovate; stamens 2, anthers elliptic, 2-valvate, filaments very short: ♀ about 7.6–15.6 cm. long when ripe; rhachis and bract as in the male; ovary free, glabrous, ovate; stigmas 3, linear. *Berry* sessile, subobovate-globose, shortly mucronate, 4.2 mm. long, black when dry.

PERAK: on Maxwell's hill, at 3000 ft. altitude, March, *Scorte-*

chini 285; Larut at 2800-3000 ft. altitude, August, *King's Collector*, 3230; on limestone hills at Goping 300-500 ft. altitude, 5906.

19. *PIPER LONGUM*, Linn. Sp. Pl. 29 (1753) (*exclus.* Syn. Rumph.). Creeping below, flowering shoots erect. Branches glabrous, pale brown when dry, the spiciferous 1 mm. thick; collenchyma in distinct bundles, libriform in its inner zones; a single central lysigenous canal. *Leaves* shortly petioled; limb membranous when dry, copiously pellucid-dotted, about 6-10 cm. long and 2.5-3.5 cm. wide, glabrous above, minutely pubescent on the nerves underneath; oblong-ovate, acutely acuminate, the base cordate equilateral or slightly wider on one side than on the other; 5-7-nerved, the 3 central nerves stouter than the others; petiole minutely pubescent, about 6 mm. long in the upper leaves, sheath basal. *Peduncle* minutely pubescent, 21-24 mm. long in the male, 12.6-14.6 mm. in the female. *Spike*: ♂ up to 5.5 cm. long and 3 mm. thick; rhachis glabrous; bract glabrous, its limb rounded 1.5 mm. in diam., with a rather long central pedicel; stamens 2, anthers elliptic, filaments short: ♀ about 15 mm. long and up to 4.5 mm. thick when flowering; rhachis and bract as in the male; ovary partly imbedded in the rhachis, its upper portion free and glabrous; stigmas 3, ovate-acute. *Berry* partly imbedded in the rhachis, its upper free portion glabrous and globose, 2 mm. in diam., blackish when dry. *P. longum Pistolochiae* Pluk. Almag. 297, Phyt. t. 104, fig. 4, Herb. Pluk. 97, fol. 105; 'Cattu tirpali,' Rheede, *Hort. Mal.* VII. 27, t. 14. *P. jolii cordatis petiolatis sessilibusque*, Linn. Fl. Zeyl. 30. *P. longum*, Herb. Burm. 4, fig. 3; Hill Dict. 26, 17. t. 17 fig. 1; Vahl Enum. I. 334; Willd. Sp. Pl. 1. 161; Herb. Willd. n. 698, fol. 1; Roxb. Fl. Ind. I. 156; Lour., Fl. Cochinch. 40; C. DC. in Prodr. XVI. i. 355; Hook. f. Fl. Brit. Ind. V. 83. *Chavica Roxburghii*, Miq. Syst. Pip. 239; Ill. Pip. 35, t. 30; in Hook. Lond. Journ. IV. 433; in Linn. XX. 130; in Fl. Ind. Bat. I. ii. 430; Hayne Arnz. Gewachs. XIV. t. 20.

PENANG: *Curtis* 887; near the bank of Kuila river, *King's Collector* 385. SELANGOR: Langat, *Ridley* 399. PAHANG: Pekan, *Ridley* 1004.—DISTRIB.—India, Malay Archipelago.

20. *PIPER SUBFRAGILE*, C. DC. in Records Bot. Surv. Ind. VI, 9 (1912). Scandent. Branches glabrous, light brown when dry, the spiciferous 0.5 mm. thick; collenchyma in distinct bundles, libriform; a central and several lysigenous canals. *Leaves* shortly

petioled, glabrous; limb subcoriaceous when dry, copiously pellucid-dotted, 5.5 cm. long, 3.6 cm. wide, ovate, shortly and subacutely attenuate, the base rounded, both sides of same width, one slightly longer than the other; 7-plinerved, the central nerve emitting 2 ascendent opposite nerves from nearly 8.4 mm. above the base, and having on each side of it 2 nerves free from the base, the inner ascendent, the outer subascendent; petiole 6.6 mm. long, of which 2.1 between the sides of the limb. *Peduncle* glabrous, 3.3 mm. long when still young. *Spike*: ♀ 10.5 mm. long, 2 mm. thick; rhachis hirsute; limb of bract rounded, glabrous with a central hirsute pedicel; ovary glabrous, its lower portion imbedded in the rhachis:—

PERAK: Kurau, in the plains, May, *Wray* 4262.

A species very much like *P. fragile*, Benthams, from which it differs by the structure of the branches.

21. *PIPER MINUTISTIGMUM*, C. DC. in Records Bot. Surv. Ind. VI. 9 (1912). A very large pepper, 9—12 m. long. Branchlets glabrous, light brown when dry, the spiciferous up to 3 mm. thick; collenchyma continuous, its inner zone sparingly libriform; no peripheric lysigenous canal; very abundant fuscous cells in bark and pith. *Leaves* moderately long petioled, glabrous; limb rigid when dry, minutely and sparingly pellucid-dotted, 13.5 cm. long, 7 cm. wide; ovate, acutely acuminate, the base rounded, both sides of same width but unequally long; 9-plinerved, the central nerves emitting 2 alternate ascendent nerves, the uppermost from 16.5—19.8 mm. above the base, and having on each side of it 3 nerves free from the base, all nerves prominent underneath; petiole 19 mm. long of which 6.3 mm. between the sides of the limb, sheath basal. *Peduncle* glabrous 5.8—7.7 cm. long. *Spike*: ♀ cylindric about 9 cm. long and nearly 4 mm. thick when ripe; rhachis velutino-puberulous; bract glabrous, its limb ovate-rounded 1.5 mm. long, with a very short and thick pedicel inserted below its centre; ovary deeply imbedded in the rhachis, convex and velutino-puberulous in its upper free portion; stigmas 3 minute. *Berry* subquadangular at the apex.

PERAK: Larut, September, *King's Collector* 2388; *Scortechini*.

22. *PIPER BETLE*, Linn. Sp. Pl. Ed. 1, 28 (1753). Scandent. Branches glabrous, brown when dry, the spiciferous 0.5 mm. thick; collenchyma continuous or subcontinuous, partly libriform; a central and several peripheric lysigenous canals, abundant brown cells in bark and pith. *Leaves* glabrous; limb membranous when dry,

very minutely pellucid-dotted, 10—13 cm. long, 45—90 mm. wide; ovate or rounded-ovate, acutely acuminate, the base equilateral, rounded or more or less cordate in the inferior leaves, 5-plex-9-plex-nerved, the central nerve emitting on each side 1—2 ascendent nerves, the uppermost from about 20 mm. above the base, and having on each side 1—2 nerves free from the base, the external less ascendent and much thinner than the others; petiole 15—35 mm. long with a sheath prolonged up to $\frac{1}{4}$ — $\frac{1}{2}$ of its length. *Peduncle* glabrous, as long as the petiole in the male and longer than it in the female. *Spike*: ♂ nearly as long as the limb; rhachis tomentose; bract glabrous, its limb rounded or obovate, sessile at its centre; anthers elliptic, 4-valvate; filaments short, of same width as the anthers: ♀ about 5 cm. long and 10 mm. thick when ripe; rhachis tomentose; bract as in the male; base of the ovary imbedded in the rhachis, stigmas 4—5, lanceolate; *Berry* convex and tomentose in the upper part.

Vahl Enum. I. 323; Willd. Sp. Pl. I. 159; Roxb. Fl. Ind. Ed. Car. & Wall. I. 160; C. DC. in Prodr. XVI. i. 359; Hook. f. Fl. Br. Ind. V. 85 (excluding Ic. Wight and Syn. *Ch. Chuvya*, Miq.); Bot. Mag. t. 3132 (excluding fruit analysis). *Chavica Belle*, Miq. Syst. Pip. 186. *Ch. auriculata*, Miq. Syst. 269. *Aetanihe hexagyna*, Miq. Syst. Pip. 412.

Cultivated in the hotter and damper parts of India, Ceylon, the Malay Peninsula, Andamans and Nicobar Islands, Oceania.

Forma *b*, C. DC. in Philipp. Journ. Sc. V. 431. *P. Belle* var. *γ densum* in C. DC. Prodr. l.c. 360; limb more ovate and less equilateral at the base.

PENANG: Balik Pulau, *Ridley* 8029. PERAK: Waterloo, at 1500 ft. altitude, *Curtis* 2701. SELANGOR: Kwala Lumpur, *Curtis* 2368, 2369. SINGAPORE: Vern. "Sirih Batek," *Ridley* 4684.—DISTRIB.: ANDAMANS: *King's Coll.* 322. NICOBARS: *Kurz*.

23. PIPEE FEBRIFUGUM, C. DC. in Records Bot. Surv. Ind. VI. 10 (1912). Scandent. Branches densely fulvescent-villose, the spiciferous 4 mm. thick; collenchyma continuous and libriform; no peripheric lysigenous canal, or zone of globose sclerous cells between the collenchyma and the peripheric fibrovascular bundles. *Leaves* shortly petioled; limb firmo-membranaceous when dry, nearly 22.5 cm. long and 13 cm. wide; glabrous above, shortly and rather densely hirsute underneath; ovate, acutely acuminate, the base cordate with round unequally long and wide lobes inserted at the same level on the

petiole; 13-plinerved, the central nerve emitting 3 pairs of opposite ascendent nerves, the uppermost from nearly 9 cm. above the base, and having on each side of it 3 divergent nerves free from the base; petioles 10 mm. long, densely villous. *Peduncle* minutely puberulous, 45 mm. long. *Spike*: ♀ about 16.5 cm. long, 3.5 mm. thick when flowering; rhachis hirsute; bract glabrous, its limb round with a short central and thick pedicel; ovary half imbedded in the rhachis, umbonate and glabrous above; stigmas 3, ovate-acute. *Berry* black when dry.

SUNGEI UJONG: Vern. "Akar Sangkap," *Cantley* 1867.

The roots when boiled are given in cases of fever.

24. *PIPER PORPHYROPHYLLUM*, N. E. Brown in Gard. Chron. (1884) XXII. 438. Scandent. Branches glabrous, the spiciferous 0.5 mm. thick; collenchyma libriform, in distinct bundles; a single central lysigenous canal. *Leaves* moderately long petioled, glabrous; limb membranous when dry, marble pink underneath when living, nearly 10.5 cm. long and 4.5 cm. wide, elliptic, shortly and acutely acuminate, the base acute and shortly inequilateral; 7-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from nearly 2.5 cm. above the base, and having on each side of it 2 ascendent nerves free from the base; petiole 8.5 mm. long of which 1 mm. between the sides of the base. *Peduncle* up to 17 mm. long, glabrous. *Spike*: ♂ a little longer than the limb, rhachis hirsute; bract glabrous, oblong, adnate, free at the margin, rounded at both ends; stamens 3, anthers small obovate, filaments very slender: ♀ up to twice as long as the limb, rhachis and bract as in the male; ovary free, glabrous, stigmas 4 linear. *Berry* ovate, attenuate at the apex, 5 mm. long, reddish-black and longitudinally wrinkled when dry. *P. nigrum*?, Wall. Cat. 6643 E, F. ex Hook. f. in Fl. Br. Ind. V. 96. *Cissus*? *porphyrophyllus*, Lindl. in Journ. Hort. Soc. I. 225 and Fl. des Serres Ser. 2, IV. t. 1491. (a sterile specimen).

PERAK: Hijau range, *Curtis* 2048. DINDINGS: *Ridley* 3035. Malacca, Singapore and Penang, *Wallich* 6643.

Found in the whole Peninsula from Tringganu to Singapore.

25. *PIPER NIGRUM*, Linn. Sp. Pl. Ed. 1, 28 (1753). Climbing, quite glabrous. Branches terete, the spiciferous 2—3 mm. thick; collenchyma libriform, continuous, in a thin layer; a central and many peripheric lysigenous canals. *Leaves* moderately long petioled; limb coriaceous, more or less glaucous underneath, minutely pellucid-

dotted, 11—15 cm. long, 5—9 cm. wide, a little narrower on one side of the central nerve than on the other side; ovate-elliptic, acutely acuminate, the base subattenuate and equilateral; 7-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from about 35 mm. above the base, and having on each side of it 2 ascendent nerves free from the base, the outer much shorter and less ascendent than the others; petiole 2—3 cm. long, with sheath prolonged up to its middle or a little higher. *Peduncle* nearly as long as the petiole. *Spike* about as long as the limb; bracts linear-oblong, adnate to the rhachis and free from it only at the margins, the lower end obtuse, the upper more rounded; flowers commonly unisexual and dioecious, more rarely bisexual, surrounded by a sort of calicule formed by the ends of the adjacent bracts; stamens 2, anthers rounded-reniform much shorter than the fleshy filaments; ovary free, rounded, stigmas 3—4, rarely 5, lanceolate. *Berry* sessile, globose, red when fresh, drying black, 3—4 mm. in diam. Vahl Enum. I. 329; Roxb. Fl. Ind. I. 150 and Ed. Carey & Wall. I. 153; Blume in Verh. Bat. Genoots. XI. 191, f. 11—17; Miq. Syst. Pip. 308, Ill. Pip. 50, t. 50; C. DC. in Prodr. XVI. i. 363; Hook. f. Fl. Br. Ind. V. 90; Hayne Arnz. Gewachs. XIV. t. 6; Bot. Mag. t. 3139; Schitzl. Icon. II. t. 81.

Cultivated in the damp parts of India, Ceylon, the Malay Archipelago and most other tropical countries.

Var. *subpenninervis* C. DC. *n. var.*, limb elliptic-lanceolate 17.5 cm. long, 7.5 cm. wide, acutely and rather long acuminate, the base equilateral, acute, the central nerve emitting 4 ascendent nerves, the uppermost from nearly 6 cm. above the base, and having on each side of it one ascendent nerve free from the base; flowers bisexual, stamens 3. *Berry* elliptic-globose, attenuate and acute at the apex, 4 mm. long.

DINDINGS: Gunong Tungul, *Ridley* 8018. PERAK: *Ridley* 8027, 8382; Waterloo, *Curtis* 2700. SELANGOR: high cave Gua Batu, *Curtis* 8180.—DISTRIB.: Tenasserim, *Helfer* 4425.

26. *PIPER FLAVISPICUM*, C. DC. in Records Bot. Surv. Ind. VI. 10 (1912). Erect, 2 feet high. Branches glabrous, the spiciferous about 1.5 mm. thick; collenchyma libriform, in distinct and rather thick bundles; a single central lysigenous canal. *Leaves* very shortly petioled, glabrous; limb membranous when dry, minutely pellucid-dotted, 13—15 cm. long and 4.5—5.5 cm. wide, elliptic-lanceolate, rather long acuminate, the base acute and equilateral; 7-plinerved, the central nerve emitting 2 alternate ascendent nerves, the upper-

most from nearly 4 cm. above the base, and having on each side of it 2 lateral ascendent nerves free from the base, the external much shorter and thinner than the others; petiole 4 mm. long with basal sheath. *Peduncle* glabrous, 6.3 mm. long. *Spike*: ♂ 5.6 cm. long, 1 mm. thick, rhachis glabrous; bract glabrous, its limb oblong-obovate, 2.5 mm. long, up to 1.5 mm. wide; stamens 3, anthers ovate, 4-valvate, nearly as long as the oblong filaments: ♀ 5.6 cm. long and yellow when ripe; bract as in the male. *Berry* free, ovate, 4 mm. long, drying black.

PERAK: Sunga Prya, near a small limestone hill in dense jungle, *King's Collector* 1004.

27. *PIPER LONGICAULE*, C. DC. in Records Bot. Surv. Ind. VI. 11 (1912). Climber, 6—7 cm. long, clinging to trees and shrubs. Branches glabrous, light brown when dry, the spiciferous 1 mm. thick; collenchyma libriform, in distinct thin bundles; a single central lysigenous canal. *Leaves* moderately long petioled, glabrous; limb rigid-membranous when dry, minutely and inconspicuously pellucid-dotted; 7.5—10 cm. long, 3.5—4 cm. wide, elliptic-lanceolate, acutely acuminate, the base subacute and slightly longer on one side than on the other; 7-plinerved, the central nerve emitting 2 alternate ascendent nerves, the uppermost from 12—14 mm. above the base, and having on each side of it 2 ascendent nerves free from the base, the external much thinner and shorter than the others; petiole nearly 7 mm. long, sheath basal. *Peduncle* glabrous, about 12 mm. long, 0.5 mm. thick. *Spike*: ♂ nearly 8 cm. long and 1 mm. thick; flowers almost verticillate; rhachis hirsute; bract adnate, obovate-oblong, 1.5 mm. long, obtuse at the lower end, rounded or shortly attenuate at the apex, minutely puberulous on the back and ciliolate at the free margins; stamens 3, anthers obovate, 4-valvate, little longer than the oblong filaments: ♀ up to 19.5 cm. long, white on the living plant when flowering; rhachis hirsute 1.5 mm. thick; bract 2.5 mm. long, otherwise as in the male; ovary free, glabrous; stigmas 4—5, linear, acute, recurved. *Berry* ovate, subacute at the apex, nearly 2.5 mm. long, yellow or red when living, brown when dry.

PENANG: *Curtis* 1318. PERAK: Ulu Slim at 500—800 ft. altitude, in dense jungle and on rocky soil, *King's Collector* 10673; *Scortechini*; Larut, at 1000—3000 ft. altitude, *King's Collector* 2545; 4048, 5876; Kota, Larut, in plains, August, *Wray* 2857; *Tapa* 1347. MALACCA: *Mairiyay* K.D. 1335.—DISTRIB. INDIA, *Wight* 2556.

28. *PIPER KOTANUM*, C. DC. in Records Bot. Surv. Ind. VI. 11 (1912). Branches glabrous, blackish when dry, the spiciferous 1 mm. thick; collenchyma libriform, continuous; a single central lysigenous canal. *Leaves* shortly petioled; limb rigid-membranous when dry, minutely pellucid-dotted; up to 12 cm. long and 5 cm. wide; glabrous above, velutino-puberulous underneath; elliptic, acutely acuminate, the base slightly inequilateral, acute on the shortest, rounded on the longest side; penninerved, the central nerve emitting on each side 3 ascendent nerves, the uppermost from 31.5—37.5 mm., the lowest from a little above the base; petiole glabrous, up to 8.5 mm. long. *Spike*: ♀ 6.4 cm. long, 1 mm. thick; rhachis glabrous; bract glabrous, elliptic, adnate to the rhachis and free only at the margins, a little over 1 mm. long and 0.25 mm. wide; ovary free; stigmas 3, triangular, acute at the apex. *Berry* globose, nearly 3 mm. in diam., black when dry.

PERAK: Kota, in the plains, Wray 1947.

29. *PIPER LEPTONEMA*, Hook. f. Fl. Br. Ind. V. 91 (1885) *excl. specimens of Zollinger*. Scandent. Branches glabrous, drying brown, the spiciferous 1 mm. thick, in those 2 mm. thick collenchyma libriform in distinct thin and laterally widened bundles; a single central lysigenous canal. *Leaves* moderately long petioled, glabrous; limb membranous when dry, minutely pellucid-dotted, about 10.5 cm. long and 4.5—6.5 cm. wide in the male, 7.6—10 cm. long and 4.4—5 cm. wide in the female; elliptic, acutely acuminate, the base rounded and nearly equilateral; 7-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from 12.5—14.7 mm. above the base and having on each side of it 2 nerves free from the base, the inner ascendent, the outer subascendent, much shorter and thinner than the others; petiole 8.5—12.5 mm. long, sheath basal. *Peduncle* glabrous, very slender, 12.6—14.7 mm. long. *Spike*: ♂ nearly 9 cm. long, flowers obliquely verticillate; rhachis hirsute with no lysigenous canal; bracts oblong, rounded at both ends, adnate, very tightly condensed, raised but not thinned at the lateral margins, free only at the ends, very minutely puberulous and ciliate, the adnate surface containing large lysigenous cells; stamens 3, anthers exsert, obovate-elliptic, 4-valvate, shorter than the oblong filaments: ♀ nearly up to 13 cm. long, rhachis and bract as above, ovary glabrous, ovate, prolonged at the apex into a short and thick style, stigmas 4—5, oblong, subulate at the top. *Berry* sessile, oblong-ovate, with a short and thick style, 4.2 mm. long, black when dry.

PERAK: Larut at 1200 ft. altitude, November, *Kunstler* 2557; in dense jungle, rocky soil, at 600—800 ft. altitude, a long creeper over 50 feet long, *King's Collector* 1067, male specimens; *Wallich*, female specimen in Herb. Calcutta.

With its bracts the lateral margins of which are not thinned, this species is somewhat intermediate between sections EUPIPER and MULDERA.

30. *PIPER DINDINGSANUM*, C. DC. in *Records Bot. Surv. Ind.* VI. 12 (1912). Branches glabrous, the spiciferous 2 mm. thick; collenchyma nearly continuous and partly libriform; a central and several peripheric lysigenous canals. *Leaves* moderately long petioled, glabrous; limb membranous when dry, up to 12·5 cm. long and 6·5 cm. wide, ovate, acutely acuminate, the base equilateral and rounded or repand subcordate; 7-plinerved, the central nerve emitting 2 opposite ascendent nerves from about 10 mm. above the base, and having on each side of it 2 subascendent nerves from the base, the external much thinner than the others; petiole 10 mm. long with a basal sheath. *Peduncle* 14·7 mm. long, glabrous. *Spike*: ? 16·8 mm. long when ripe, rhachis hirtillous; bract glabrous, its limb rounded, 1 mm. wide with a central moderately long pedicel containing gelified cells; ovary free, glabrous, ovate; stigmas 3 linear. *Berry* obovate-globose, 3 mm. long, black when dry.

DINDINGS: July, *Ridley* 8370.

31. *PIPER CANINUM*, Blume in *Verh. Batav. Genoots.* XI. 214, f. 26 (1862). Scandent. Branches glabrous, branchlets brown when dry, shortly hirtillous when young in the male, more densely and longer hirsute in the female, the spiciferous nearly 0·5 mm. long in the male 1 mm. in the female; collenchyma in distinct bundles, its internal zone libriform; a single row of intramedullar bundles; a single central lysigenous canal in the male and a few peripheric in the female; an interfascicular zone of sclerosed cells opposite the medullary rays in the male. *Leaves* shortly petioled; the limb membranous and with pellucid dots when dry, glabrous above more or less pilose underneath; up to 11 cm. long and up to 23 mm. wide in the male and to 4 cm. in the female; ovate-oblong, acutely acuminate, the base equilateral attenuate; 5-plinerved, the central nerve emitting 2 ascendent nerves the uppermost from 10·5 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole slender, up to 10·5 mm. long with basal sheath. *Peduncle* as long as the petiole, puberulous. *Spike*: ♂ many times shorter than

the limbs; rhachis hirsute; limb of the bract rounded, hirtillous above and ciliate with a central short pedicel; stamens 2, anthers globose, 4-valvate: ♀ many times shorter than the limbs; rhachis and bracts as in the male; ovary free, glabrous, stigmas 3—4, ovate, acute. *Berry* ovate-globose, black and 5 mm. long when dry, its stipe nearly of same length. A. Dietr. Sp. Pl. I. 681; C. DC. in Prodr. XVI. i. 341; Hook. f. Fl. Br. Ind. V. 82; C. DC. in Philipp. Journ. Sc. V. 458. *P. Cubeba* Vahl Enum. I. 332; Roxb. Fl. Ind. I. 159 and Ed. Carey & Wall. I. 161; Wall. Cat. 6645. *Cubeba canina*, Miq. Comm. Phyt. 33, t. 3, Syst. Pip. 293, Fl. Ind. Bat. I. ii. 449 and Ann. Mus. Bot. Lugd. Bat. fasc. V. 137.

PERAK: at Gunong Bintang, *Kunstler* 281; in Upper Perak alt. 300 ft., *Wray* 3606; at Kwala Wok, *Wray* 853; at Bukit Tungul, *Ridley* 3356. SINGAPORE: *Ridley* 4686; at Selitar, *Ridley* 4688; *Ridley* 6425; Tanjong Katong, jungle by road to Siglap, *Ridley*.

32. *PIPER MALACCENSE*, C. DC. in Records Bot. Surv. Ind. VI. 12 (1912). Branches hirsute when young, glabrous afterwards; the spiciferous 1.5 mm. thick; collenchyma continuous, not libriform; a central and many peripheric lysigenous canals. *Leaves* shortly petioled; limb membranous when dry very minutely pellucid-dotted, up to 17.5 cm. long and nearly up to 6 cm. wide, hirsute on both surfaces on the nerves; elliptic-lanceolate, acutely and rather long acuminate, the base slightly inequilateral, acute or rounded on the longer side; penninerved, the central nerve emitting on each side 3 ascendent nerves, the uppermost from about 5.5 cm. above the base; petiole densely hirsute, 7 mm. long, of which 2 mm. between the sides of the limb, sheath basal. *Peduncle* hirsute, nearly as long as the petiole. *Spike* 3 cm. long; rhachis hirsute; bract glabrous, its limb rounded 1.5 mm. in diam.; flowers sometimes bisexual, then stamens 1—2, anthers rounded; ovary free, ovate, glabrous; stigmas 4, linear, acute. *Berry* globose, 3 mm. long, black when dry, much longer than its stipe.

MALACCA: Vern. "Poku Pimpin," *Ridley* 2338; at Merliman, *Ridley* 1617.

33. *PIPER SELANGORENSE*, C. DC. in Records Bot. Surv. Ind. VI. 13 (1912). Scandent. Branches glabrous, slender, the spiciferous 1 mm. thick, greenish when dry; collenchyma in distinct laterally widened bundles, partly libriform; a single central lysigenous canal; many fulvescent cells in pith and bark. *Leaves* shortly petioled,

glabrous; limb rigid-membranous when dry, copiously and minutely reddish-pellucid-dotted, up to 9 cm. long and 4.5 cm. wide, oblong-ovate and subobtusely acuminate, the base rounded, both sides of same length one of them wider than the other; 5-nerved, the central nerve emitting many strong patulous veins and having on each side of it 2 ascendent nerves free from the base, the outer much thinner than the inner; petiole about 6 mm. long. *Peduncle* 12 mm. long, slender, glabrous. *Spike*: ♀ nearly 26 mm. long, rhachis hirtillous; bract glabrous, its limb obovate, 3 mm. long with a thick central pedicel containing gelified cells; ovary free, ovate; stigmas 3, oblong, short and blunt. *Berry* stipitate, black when dry, about 4 mm. long, its stipe 3 mm. long.

SELANGOR: Semangkoh, Sempang Mines, *Ridley* 15565.

34. *PIPER SUBALBICANS*, C. DC. in *Records Bot. Surv. Ind.* VI. 13 (1912). Branches glabrous, drying brown, the spiciferous 1.5 mm. thick; collenchyma partly libriform in distinct bundles; a single central lysigenous canal; numerous orange-coloured cells in bark and pith. *Leaves* glabrous, moderately long-petioled; limb membranous and pale when dry, whitish underneath when living, up to 12.5 cm. long and 58 mm. wide; oblong-ovate, acutely acuminate, the base slightly inequilateral, rounded on the longest attenuate on the shortest side; 7–9-plinerved, the central nerve emitting on each side 2–3 ascendent nerves, the uppermost from 26–39 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole slender, up to 10 mm. long of which 2 mm. between the sides of the limb, sheath slightly prolonged above the base of the petiole. *Peduncle* very slender, glabrous, about 10–12 mm. long. *Spike*: ♀ nearly 32 mm. long; rhachis hirsute; bract glabrous, obovate, subattenuate towards its lower end, 3 mm. long, up to 1 mm. wide, sessile above its centre; ovary free, glabrous, ovate; stigmas 3, ovate, short. *Berry* elliptic and longer than its stipe while still young, drying black.

PERAK: Gunong Batu Putih, lower camp, at 3400 ft. altitude, *Wray* 448.

35. *PIPER CURTISII*, C. DC. in *Records Bot. Surv. Ind.* VI. 14 (1912). Slender creeper, 3–4.5 m. long, clinging to the stems of trees. Branches glabrous, the spiciferous up to 1 mm. thick; collenchyma continuous, partly libriform; a single central lysigenous canal; numerous yellow cells in bark and pith. *Leaves* moderately long-petioled,

glabrous; limb membranous when dry, copiously black-dotted underneath, 9—11.5 cm. long 3.7—4.5 cm. wide, subobovate-elliptic-lanceolate, acutely acuminate, the base equilateral and acute; 5-plinerved, the central nerve emitting 2 ascendent nerves from about 2 mm. above the base with many spreading veins higher up, and having on each side of it one ascendent nerve free from the base; petiole very thin, 10 mm. long, sheath basal. *Peduncle* glabrous, very thin, as long as the petiole. *Spike*: ♀ slender, 4 cm. long; rhachis hirsute; bract glabrous, its limb elliptic 2 mm. long with a central short and thick pedicel containing gelified cells; ovary free, glabrous; stigmas 3—4, ovate-acuminate. *Berry* globose, yellowish-red when living, black when dry, nearly 4 mm. in diam., its stipe a little shorter.

PERAK: at Waterloo in May, *Curtis* 2699; at Larut at 2500—3000 ft. altitude, *King's Collector* 6263; *Scortechini*. SELANGOR: Kwala Lumpur, *Curtis*. MALACCA: where Vern. "Akar Siri Haton", *Ridley* 2337.

36. *PIPER PAUCISTIGMUM*, C. DC. in Records Bot. Surv. Ind. VI. 14, (1912). Slender creeper; branches glabrous, the spiciferous nearly 1 mm. thick; collenchyma libriform in distinct laterally much widened bundles; a single central lysigenous canal; numerous yellow cells in bark and pith. *Leaves* moderately long-petioled, glabrous; limb membranous when dry, copiously blackish-dotted underneath, up to 10.5 cm. long and 32 mm. wide; oblong-elliptic, acutely acuminate, the base equilateral and acute; 5-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from about 26 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole very slender, 8.4 mm. long, sheath basal. *Peduncle* very slender, as long as the petiole, glabrous. *Spike*: ♀ nearly 4 cm. long; rhachis puberulous; bract glabrous, its limb obovate, 1 mm. long and up to 1 mm. wide, with a central short pedicel; ovary free, glabrous; stigmas 2 or 3, ovate-acuminate. *Berry* sealing-wax red when living, black when dry, globose, nearly 3 mm. in diam., its stipe shorter.

PERAK: near Ulu Kerling, April, on trees in dense bamboo forest, at 500—700 ft., *King's Collector* 8820; *Scortechini*.

37. *PIPER MAXWELLANUM*, C. DC. in Records Bot. Surv. Ind. VI. 15 (1912). Scandent. Branches glabrous, light brown when dry, the spiciferous 2 mm. thick; collenchyma continuous and libriform; a single central lysigenous canal; numerous orange-coloured cells in

bark and pith. *Leaves* moderately long-petioled, glabrous; limb membranous when dry, reddish-dotted underneath, up to 7.5 cm. long and 36 mm. wide; elliptic-lanceolate, acutely acuminate, equilateral and acute at the base; 7-plinerved, the central nerve emitting on each side 2 ascendent nerves, the uppermost from 26 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole slender, 11 mm. long, sheath basal. *Peduncle* glabrous, slender, 8-14 mm. long. *Spike*: ♀ about 36 mm. long, rachis hirtellous; bract glabrous, obovate, 1.5 mm. long and up to 1.5 mm. wide, shortly pedicellate above its centre, the pedicel containing gelified cells; ovary free, ovate, glabrous; stigmas 3, ovate-acute. *Berry* stipitate, globose, transparent and red when living, black when dry, about 4 mm. in diam., the stipe a little shorter.

PERAK: Maxwell's hill, at 2500 ft., Wray 1734.

38. PIPER PEDICELLOSUM, Wall. Cat. 6646 A. (1828). Scandent. Branches glabrous, dark brown when dry, the spiciferous 2 mm. thick; collenchyma libriform in distinct often laterally much widened bundles; a central and one or two peripheric lysigenous canals; sclerosed cells in the bark between the masses of phloem of the peripheric fibro-vascular bundles. *Leaves* shortly petioled, glabrous; limb subcoriaceous when dry, copiously pellucid-dotted, 9 cm. long, 38-44 mm. wide; ovate, obtusely acuminate, the base cordate and slightly inequilateral; 7-9-plinerved, the central nerve emitting on each side 2 pairs of ascendent opposite nerves, the uppermost from only 6 mm. above the base, and having on each side of it 1-2 nerves free from the base, the external more curved and thinner than the others; petiole 6.3 mm. long of which 2 mm. between the sides of the limb. *Peduncle* glabrous, 8-9 mm. long, 4.5 mm. thick. *Spike*: ♀ 2.5-4 cm. long, rachis hirsute; bract puberulous on the back and ciliolate on the margins, adnate above its centre, oblong-obovate, attenuate and subacute toward the lower end; ovary free, ovate, glanduloso-asperulate; stigmas 4 or more rarely 3, ovate oblong and acute. *Berry* globose, yellowish-red when living, black when dry, 5 mm. in diam., its stipe 6 mm. long, very minutely puberulous. C. DC. in Prodr. XVI. i. 343, exclud. spec. *P. Lambertii*; Hook. f. Fl. Br. Ind. V. 81. *Cubeba Neesii*, Miq. Syst. Pip. 292.

PERAK: Larut, at 100 ft. a large pepper 60-100 ft. long clinging to trees, February, *King's Collector* 5571; at alt. 1200-1500 ft., *King's Collector* 10761. MALACCA: at Ayer Panas, November. *Ridley*

1612. SINGAPORE : *Wallich* 6646 A.—DISTRIB. Assam, Andaman Islands.

Forma *b* ; limb yellow when dry, uppermost pair of lateral nerves emitted from 26 mm. above the base.

ANDAMANS : Goplakabang, *King's Collector*.

39. *PIPER RIBESIOIDES*, Wall. Pl. As. Rar. I. 79, t. 9 (1830) and Cat. 6637 (1828). Scandent. Branches pale when dry, glabrous, the spiciferous about 4 mm. thick ; collenchyma continuous, libriform ; a central and several peripheric lysigenous canals. *Leaves* very large, moderately long-petioled, glabrous ; limb coriaceous and pale brown when dry, about 25 cm. long, 11 cm. wide ; oblong-ovate, acutely acuminate, the base equilateral, deeply cordate ; 9—13-plinerved, the central nerve emitting 1—3 ascendent nerves, the uppermost from about 9 cm. above the base, and having on each side of it 3 nerves free from the base ; petiole about 4—5 cm. long and 5 mm. thick, sheath basal. *Peduncle* glabrous, about 8.4 mm. long and 2 mm. thick. *Spike* : ♀ 6—8 cm. long ; rhachis hirsute ; bracts glabrous, adnate, free at the margin, oblong, rounded at both ends ; ovary free, ovate-oblong, glabrous ; stigmas 3, oblong, acuminate, recurved. *Berry* globose, about 6 mm. long, its stipe nearly of same length. C. DC. in Prodr. XVI. 1. 342 ; Hook. f. Fl. Br. Ind. V. 81. *Cubeba Wallichii*, Miq. Syst. Pip. 289, Ill. Pip. 47, tab. 46, 47.

KEDAH : Langkawi, Gunong Raya, *Curtis* 2541. PERAK : at 300 ft. altitude, *Wray* 3726 ; at Batu Togoh, *Wray* 70904 ; at alt. 200 ft., *Wray* 2184 ; at Waterfall, Taiping, *Wray* 4244. MALACCA : *Good-enough* 1496.—DISTRIB. Burma, Tenasserim, Andamans.

Forma *b* C. DC. n. f. limb only slightly cordate or rounded at the base, ♀ spikes generally 2 at the top of a branch, one opposite an undeveloped leaf.

PERAK : Larut at 300—600 ft. altitude, *King's Collector* 1942 ; at Sungei Ryah, *King's Collector* 900 ; plains, *Wray* 4243. SELANGOR : Camphor forest, Rawang, *Ridley* 7608. MALACCA : *Maingay* K.D. 1331 ; *Derry* 80, 82.

Forma *c* C. DC. n. f. Limb subobovate-oblong, cordate or rounded at the base. *Peduncle* 4 mm. long and very slender in the male plant. *Spike* : ♂ about 33 mm. long, 1 mm. thick, rhachis hirtellous ; bract glabrous, adnate, free at the margin, oblong, rounded at both ends ; stamens 2, anthers obovate : ♀ generally solitary. peduncle and rhachis as in the type ; bract minutely ciliate at the

margins. *Berry* glossy, bright when young, red when ripe. *Piper sumatranum*, C. DC. in Prodr. XVI. i. 343; Hook. f. Fl. Br. Ind. V. 81. *Cubeba sumatrana*, Miq. Comm. Phyt. 42, tab. V, fig. A. Syst. Pip. 290, Fl. Ind. Bat. I. ii. 448, Suppl. 8.

PENANG: back of west hills, at 500 ft. altitude, *Curtis* 2256. PERAK: Larut, at 500—1000 ft., a large creeper 40—60 ft. long. *King's Collector* 6618; alt. 2000—2500 ft., *King's Collector* 2901; *Scortechini* 165. SINGAPORE: Reservoir Road, *Ridley* 4825.—DISTRIB. Tenasserim, Andaman Islands, Sumatra.

40. *PIPER MUCRONATUM*, C. DC. in Records Bot. Surv. Ind. VI. 15 (1912). Creeper; branches glabrous, drying brown, the spiciferous 1 mm. thick. *Leaves* shortly petioled, glabrous; limb coriaceous when dry, up to about 10.5 cm. long and 4.2 mm. wide; oblong-elliptic, acutely and rather long acuminate, the base equilateral, obtuse; 5-plinerved, the central nerve emitting 2 opposite ascendent nerves from 10 mm. above the base and having on each side of it one ascendent nerve free from the base; petiole 6 mm. long, sheath prolonged nearly up to the middle of the petiole. *Peduncle* glabrous, 6 mm. long. *Spike*: ♀ nearly 21 cm. long; rhachis puberulous; bract glabrous, adnate, linear-oblong, obtuse at both ends. *Berry* glabrous, elliptic, 2 mm. long, attenuate at the top into a style, its stipe 1 mm. long.

SUNGEI UJONG: *Ridley* 2126.

41. *PIPER LONGIBRACTEUM*, C. DC. in Records Bot. Surv. Ind. VI. 16 (1912). Branches glabrous, drying brown, the spiciferous 1.9 mm. thick; collenchyma libriform, in distinct bundles; a single central lysigenous canal. *Leaves* rather long-petioled, glabrous; limb elliptic-lanceolate, acutely acuminate, the base acute and equilateral, 11.5 cm. long, 5—6 cm. wide; 7-plinerved, the central nerve emitting 2 alternate ascendent nerves, the uppermost from 16 mm. above the base, and having on each side of it 2 ascendent nerves free from the base, the external much thinner and shorter than the others; petiole slender, 12—16 mm. long, sheath basal. *Peduncle* glabrous, slender, 16 mm. long. *Spike*: ♀ 10.5 cm. long; rhachis glabrous, 1 mm. thick; bract glabrous, oblong-obovate, attenuate at the base, nearly 2.2 mm. long, sessile above its middle; ovary free, glabrous; stigmas 4, ovate-acuminate. *Berry* stipitate, elliptic, black when dry, 4 mm. long, its stipe a little shorter.

PERAK: Maxwell's hill, *Wray* 101.

42. *PIPER XANTHOCARPUM*, C. DC. in Records Bot. Surv. Ind. VI. 16 (1912). Scandent. Branches glabrous, drying brown, the spiciferous 1 mm. thick; collenchyma continuous, libriform; a single central lysigenous canal; abundant orange-coloured cells in bark and pith. *Leaves* shortly petioled; limb up to 14.5 cm. long and 6 cm. wide; elliptic-lanceolate, acutely acuminate, the base equilateral acute; glabrous above, puberulous underneath; 7—9-plinerved, the central nerves emitting on each side 1—2 ascendent nerves, the uppermost from 26—39 mm. above the base, and having on each side of it 2 ascendent nerves free from the base; petiole glabrous, nearly 6 mm. long, sheath basal. *Peduncle* glabrous, up to 26 mm. long, slender. *Spike*: ♀ up to 12 cm long; rhachis hirsute; bract glabrous, its limb oblong, subattenuate towards the lower end, rounded at the top, adnate, free at the margins, about 3 mm. long and up to 1 mm. wide; ovary free, ovate, glabrous; stigmas 3—4, ovate-acuminate. *Berry* globose, nearly 3 mm. in diam., orange coloured when living, black when dry, longer than its stipe.

PERAK: at 1000 ft. altitude, *Wray* 3795

43. *PIPER LARUTANUM*, C. DC. in Records Bot. Surv. Ind. VI. 16 (1912). Growing on the stems of large trees, 3—5.5 m. long. Branches glabrous, the spiciferous 2 mm. thick; collenchyma libriform, nearly continuous; a central and several peripheric lysigenous canals; abundant fuscous cells in bark and pith. *Leaves* very shortly petioled, glabrous; limb rigid-membranous when dry, copiously pellucid-dotted; 13—16 cm. long, 4.8—7 cm. wide; oblong-elliptic, acutely acuminate, the base inequilateral, rounded on the longest attenuate on the shortest side; penninerved, the central nerve emitting on each side and nearly from its whole length numerous patulo-subascendent nerves; petiole 4.8 mm. long of which 4 mm. between the sides of the limb, sheath basal. *Peduncle* glabrous, 17 mm. long. *Spike*: ♀ 5.6 cm. long, white when living, black when dry; rhachis hirsute; bract adnate, free and minutely ciliate at its margin, 4.5 mm. long, little less than 1 mm. wide, oblong, rounded at both ends; ovary free, glabrous; stigmas 3—4, ovate-acuminate. *Berry* globose, 4 mm. in diam., bright red when living, black when dry, scattered among the flowers.

PERAK: Larut, September, *King's Collector* 3327.

44. *PIPER COLLINUM*, C. DC. in Records Bot. Surv. Ind. VI. 17 (1912). Slender creeper 3.5—4.5 m. long. Branchlets glabrous, the

spiciferous 2 mm. thick; collenchyma continuous, not libriform; a single central lysigenous canal; yellow cells scattered in bark and pith. *Leaves* shortly petioled, glabrous; limb membranous when dry, black-dotted underneath; 13—16 cm. long, 4·8—7 cm. wide; elliptic-lanceolate, acutely acuminate, the base equilateral and acute; penninerved, the central nerve emitting on each side 4 subascendent and thin nerves, the uppermost from 6 cm. above the base; petiole 6 mm. long, sheath prolonged nearly to the middle of the petiole. *Peduncle* 30 mm. long, glabrous. *Spike*: ♀ nearly 8 cm. long; rhachis hirsute; bract glabrous, its limb obovate, subsessile at its centre, 1·5 mm. longer; ovary free, ovate, glabrous; stigmas 3, linear. *Berry* stipitate, ovate acute at the apex, black when dry, 5 mm. long, its stipe shorter.

PERAK: Larut, Goping on limestone hills, at 300–500 ft., April, *King's Collector* 5906; *Scortechini*.

45. *PIPER MURICATUM*, Bl. in Verh. Batav. Nat. Genoots. XI. 219, f. 1 (1826) & Enum. Pl. Jav. fasc. I. 68; Miq. Syst. Pip. 326, Ill. Pip. 55, t. 55, in Hook. Lond. Journ. Bot. IV. 438 and Fl. Ind. Bat. I. ii. 2454; C. DC. in Prodr. XVI. i. 341; Hook. f. Fl. Br. Ind. V. 82.—DISTRIB: Java, Sumatra.

forma peninsulare, C. DC. n. f. in Records Bot. Surv. Ind. VI. 17 (1912). Herb or shrub up to 3·5 m. high. Branches densely hirsute. the spiciferous 3 mm. thick, hairs nearly 0·7 mm. long; collenchyma nearly wholly libriform in distinct laterally widened bundles or continuous; a central and several peripheric lysigenous canals. *Leaves* moderately long petioled; limb membranous when dry, up to 17 cm. long and 7 cm. wide, pilose on both surfaces, oblong-elliptic, shortly and subacutely acuminate, the base inequilateral and moderately cordate; penninerved, the central nerve emitting on each side 3–4 ascendent nerves, the uppermost from 5·5–7·5 cm. above the base; petiole densely hirsute, up to 10 mm. long of which 2 mm. between the sides of the limb, sheath basal. *Peduncle* densely hirsute, as long as the petiole. *Spike*: ♀ about 4 cm. long; rhachis hirsute; bract glabrous, its limb obovate, 2 mm. long, 1 mm. wide, with a thick pedicel containing gelified cells; ovary free, ovate, globose, subacute at the apex; stigmas 3–5, linear. *Berry* stipitate, ovate-globose, subacute at the apex, glabrous, black when dry, up to 4 mm. long, its stipe 2 mm. long.

PERAK: *Scortechini*; Larut, Waterfall hill, at 500 ft. altitude,

with fruit sealing-wax red, *Ridley* 11025; at 100—2000 ft. altitude with fruit yellowish red, *King's Collector* 1958, 2880; at Jenan Wray 1757; SELANGOR: Pahang Track, *Ridley* 8531.

forma pilistipes, C. DC. l. c. 18 about 60 cm. high; limb sub-ovate-elliptic acutely acuminate, rounded and slightly inequilateral at the base. *Berry* red when living, its stipe hirtillous.

PERAK: Waterfall hill, in rocky localities, rich soil, *King's Collector* 4869; Wray 2076, 4237. SELANGOR: Kwala Lumpur, *Ridley* 4685.

forma pilosior Miq. in Linn. xxi, 485; limb elliptic or subovate-elliptic, moderately and acutely acuminate, equilateral and cordate at the base, densely fulvescent-hirsute on both surfaces.

SELANGOR: May, *Ridley* 7610.—DISTRIB. Java, Sumatra.

46. *PIPER PROTRACTUM*, C. DC. in Records Bot. Surv. Ind. VI. 18 (1912). Dioecious or monœcious and then with androgynous spikes. Branches densely hirsute, with hairs 1 mm. long, the spiciferous nearly 6 mm. thick; collenchyma continuous, partly libriform; a central and many peripheric lysigenous canals. *Leaves* shortly petioled; limb, 20·8—33·8 cm. long, 4·2—5·6 cm. wide, pilose on both surfaces especially along the nerves, oblong, subacutely acuminate, the base cordulate and slightly inequilateral; penninerved, the central nerve emitting on each side 4 nerves, the upper ones ascendent and opposite, the lower subascendent and much thinner than the others; petiole hirsute underneath, 10 mm. long of which 6 mm. between the sides of the limb, sheath prolonged above the base. *Peduncle* hirsute, about 12 mm. long. *Spike*: nearly 8·7 cm. long, with male flowers in its upper portion when androgynous, rhachis hirsute; bract glabrous, obovate, more or less attenuate towards its lower end, with a very short and thick pedicel; ovary free, ovate, glabrous; stigmas 3—4 linear. *Berry* globose, acute at the apex, 4 mm. long, its stipe nearly of same length.

JOHORE: Gunong Pulau, Castlewood, *Ridley*. SINGAPORE: Sungei Jurong, *Ridley* 5888; Chan-Chu-Kang, *Ridley* 6723.

47. *PIPER BIPEDALE*, C. DC. in Records Bot. Surv. Ind. VI. 19 (1912). Erect, 60 cm. high. Branches hirsute, the spiciferous 2 mm. thick; collenchym in distinct and laterally widened bundles, not libriform; a central and many peripheric lysigenous canals. *Leaves* moderately long-petioled; limb membranous when dry, hirsute on the nerves above and on the whole lamina underneath, 20 cm. long and up to 7 cm. wide, obovate-oblong, acutely acuminate; the base

slightly inequilateral, rounded on the longer, attenuate on the shorter side; penninerved, the central nerve emitting on each side 4—5 nerves of which the 2 uppermost ascendent, the others less so and much thinner; petiole densely hirsute, up to 14 mm. long of which 4 mm. between the sides of the limb. *Peduncle* hirsute, 12 mm. long. *Spikes*: ♀ about 32 mm. long, green when flowering; rhachis hirsute; bract glabrous, its limb obovate, 1.5 mm. long, with a central and thick pedicel containing gelified cells; ovary free, glabrous, ovate-acuminate; stigmas 3, linear and acute. *Berry* stipitate, ovate-globose, acute at the apex, black when dry, 4 mm. long, its stipe much shorter.

PERAK: at 300 ft. altitude, *Wray* 3710.

48. *PIPER RIDLEYI*, C. DC. in Records Bot. Surv. Ind. VI. 19 (1912). Erect, herb or shrub 2—3 ft. high. Branches densely hirsute with hairs nearly 1 mm. long, the spiciferous 4 mm. thick; collenchyma sparingly libriform in distinct bundles; a central and many peripheric lysigenous canals; sclerosed cells in the bark. *Leaves* shortly petioled; limb membranous when dry, nearly 25 cm. long and 12 cm. wide, hirsute on both surfaces; lanceolate-elliptic, acutely acuminate, the base acute and nearly equilateral; penninerved, the central nerve emitting on each side 5 ascendent nerves, the uppermost from about 6.5 cm. above the base; petiole hirsute, up to 10.5 mm. long. *Peduncle* hirsute, up to 1.4 cm. long in the male and up to 2.2 cm. in the female. *Spike*: ♂ nearly 10.5 cm. long and 2 mm. thick; rhachis hirsute; bract glabrous, obovate, subacute at the base with a short thick pedicel containing gelified cells; stamens 2, anthers rounded: ♀ a little shorter than in the male; rhachis hirsute; bract glabrous, obovate, up to 2 mm. long and 1.5 mm. wide with pedicel as in the male; ovary free, glabrous; stigmas 4, linear, acute. *Berry* globose, glabrous, shorter than its puberulous stipe.

PERAK: Maxwell's hill, *Curtis* 2047; Waterloo, *Curtis* 2697!; rich soil, rocky locality, at 1000-1500 ft. altitude, August, *King's Collector* 10784; Gunong Batu Putih, lower camp, alt. 3400 ft., *Wray* 428. SELANGOR: Ginting Peras, May, *Ridley* 7690; 15th mile along Pahang track, *Ridley* 8519;

forma b, branches with a continuous and nearly quite libriform collenchyma; spikes androgynous, the inferior flowers bisexual, the superior male.

PERAK: dense bamboo forest, at 500—700 ft. altitude, near Ulu

Kerling, flower light yellow, fruit sealing-wax red, *King's Collector* 8810.

49. *PIPER NIGRANTHERUM*, C. DC. in Records Bot. Surv. Ind. 20 (1912). Branches glabrous, the spiciferous 2 mm. thick; collenchyma not libriform, in distinct thick and laterally much widened bundles or even subcontinuous; no peripheric lysigenous canals; dark-reddish cells abundant in bark and pith. *Leaves* moderately long-petioled, glabrous; limb rigid-membranous when dry, minutely pellucid-dotted, up to 16.5 cm. long and 9 cm. wide; ovate, acutely acuminate, the base inequilateral, cordate, both sides inserted at the same level, one wider and longer than the other; 8-plinerved, the central nerve emitting on both sides 2 ascendent nerves the uppermost from 16 mm. above the base, and having on one side of it 3 on the other 2 nerves free from the base, the inner subascendent the outer more arcuate and much shorter; petiole nearly 15 mm. long, with sheath prolonged up to its middle. *Peduncle* as long as the petiole. *Spike*: ♂ about 9 cm. long and 3.5 mm. thick; rhachis hirsute; bract glabrous, its limb obovate, attenuate at the lower end, with a central clavate pedicel; stamens 2, anthers ovate, shorter than the filaments, dark black when dry.

SINGAPORE: in the Botanic Garden, and probably also spontaneous, *Ridley*.

50. *PIPER FILIPES*, C. DC. in Records Bot. Surv. Ind. 20 (1912). Creeping. Stalk and branches very slender, glabrous, the spiciferous branches up to 1 mm. thick; collenchyma libriform, in distinct bundles; a single central lysigenous canal; a zone of sclerosed cells between the phloem masses of the peripheric fibro-vascular bundles. *Leaves* shortly petioled, glabrous; limb membranous when dry, minutely reddish-pellucid-dotted, about 9 cm. long, 4 cm. wide; oblong-ovate, acutely attenuate, the base rounded, both sides of same length but slightly unequally wide; 5-plinerved, the central nerve emitting 2 opposite or subopposite ascendent nerves from about 6 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole very thin, with a sheath prolonged a little above its base. *Peduncle* filiform, glabrous, nearly 28 mm. long. *Spike*: ♂ 16 mm. long and nearly 1 mm. thick when flowering, white when living; rhachis hirsute; bract glabrous, its limb rounded, 0.5 mm. in diam. with a short central pedicel; stamens 3, very short, anthers rounded, 4-valvate.

PERAK: at Larut at 3200—500 ft. in open jungle on rich rocky soil, *King's Collector* 3122.

51. *PIPER RUFIBRACTEUM*, C. DC. in Records Bot. Surv. Ind. VI. 21 (1912). Branches glabrous drying brown, the spiciferous 1 mm. thick; collenchyma subcontinuous and nearly libriform; no lysigenous canal. *Leaves* very shortly petioled, glabrous; limb subcoriaceous when dry, copiously pellucid-dotted; up to 9.5 cm. long and 3.5 cm. wide; oblong-elliptic, shortly and obtusely attenuate, the base inequilateral, rounded on both sides; 9-plinerved, the central nerve emitting 2 alternate ascendent nerves the uppermost from nearly 29 mm. above the base, and having on each side of it 3 nerves free from the base the most external more arcuate much thinner and shorter than the others; petiole 5.5 mm. long of which 3 mm. between the sides of the limb, sheath prolonged a little above the base. *Peduncle* glabrous 4.2 mm. long. *Spike*: ♂ 25.5 mm. long and 1 mm. thick when nearly flowering; rhachis glabrous; limb of bract obovate, subattenuate at its lower end, densely rufo-pubescent outside, with a glabrous short and thick pedicel containing gelified cells; stamens 2 or ? 3, anthers ovate, 4-valvate, shorter than the oblong filaments.

MALACCA: *Maingay* K. D. 1329.

52. *PIPER KUNSTLERI*, C. DC. in Records Bot. Surv. Ind. VI. 21 (1912). Erect, 60—90 cm. high. Branches glabrous, drying brown, the spiciferous 0.5 mm. thick; collenchyma continuous, sparingly libriform; a single central lysigenous canal. *Leaves* glabrous, very shortly petioled; limb membranous when dry, minutely pellucid-dotted, 12.5 cm. long, 4.5 cm. wide; elliptic-oblong, acutely and rather long acuminate, the base slightly inequilateral, attenuate on the shortest sides rounded on the longest; penninerved, the central nerve emitting on each side 3 ascendent thin nerves, the uppermost from 25—30 mm. above the base; petiole about 2 mm. long with basal sheath. *Peduncle* glabrous, very slender, 6 mm. long. *Spike*: ♂ nearly 21 mm. long and 2 mm. thick when flowering, rhachis hirsute; limb of the bract orbicular, glabrous, 0.6 mm. in diam., with a short hirsute and central pedicel; stamens 3, anthers ovate, 4-valvate, much shorter than the rather long filaments.

PENANG: in dense jungle on rocky ground, February, *King's Collector* 1315.

53. *PIPER CURTIPETIOLUM*, C. DC. in Records Bot. Surv. Ind. 22 (1912). Branches glabrous, reddish-brown when dry, the spiciferous nearly 1 mm. thick; collenchyma in distinct and laterally widened bundles, not libriform; no peripheric lysigenous canals. *Leaves* shortly petioled, glabrous; limb membranous when dry, minutely pellucid-dotted, 8.5 cm. long, 26 mm. wide; elliptic-lanceolate, acutely acuminate, the base equilateral and acute; 5-plinerved, the central nerve emitting 2 ascendent alternate nerves, the uppermost from about 17 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole 5 mm. long, sheath basal. *Peduncle* glabrous, very slender, nearly 5 mm. long. *Spike*: ♂ about 17 mm. long and 1.5 mm. thick; rhachis hirsute; bract glabrous, its limb rounded, nearly 1 mm. in diam., subsessile at its centre; stamens 3, unequally long, anthers ovate, much shorter than the oblong filaments when these are fully developed.

PERAK: *Scortechini*; Gunong Inas, Wray 4145.

54. *PIPER ERECTICAULE*, C. DC. in Records Bot. Surv. Ind. 22 (1912). Erect. Branches glabrous, the spiciferous about 1 mm. thick; collenchyma libriform, continuous, rather thick; a single central lysigenous canal. *Leaves* shortly petioled, glabrous; limb membranous, black-dotted underneath when dry, up to 15 cm. long and 4 cm. wide; elliptic-oblong, acutely acuminate, the base nearly equilateral and acute very slightly wider on one side; 8-plinerved, the central nerve emitting 5 ascendent nerves of which 2 on one side 3 on the other side, the uppermost from 3 cm. above the base, and having on each side of it one ascendent nerve much shorter than the others; petiole up to 5 mm. long, sheath basal. *Peduncle* glabrous, 7 mm. long. *Spike*: ♂ 13 mm. long when flowering; rhachis hirsute; bract glabrous, its limb rounded, 1 mm. in diam., shortly pedicellate near its centre; stamens 3, anthers ovate.

KEDAH: woods on Kedah Peak, an erect pepper, June, Ridley.

55. *PIPER EUCALYPTOLIMBUM*, C. DC. in Records Bot. Surv. Ind. 23 (1912). Scandent, 4.5–6 m. long. Branches glabrous, dark brown when dry, the spiciferous 9.5 mm. thick; collenchyma in distinct bundles and partly libriform; a single central lysigenous canal. *Leaves* shortly petioled, glabrous; limb membranous when dry, minutely reddish-pellucid-dotted, about 14.5 cm. long, 4 cm. wide; elliptic-lanceolate, acutely acuminate, the base acute distinctly nar-

lower on one side, equally long on both sides; 7-plinerved, the central nerve emitting on each side 2 ascendent thin nerves, the uppermost from 5.7 cm. above the base, and having on each side of it one ascendent nerve free from the base; petiole 6.3 mm. long, with basal sheath. *Peduncle* glabrous, 8.5 mm. long, very slender. *Spike*: ♂ 6.5 cm. long and 2 mm. thick when nearly flowering; rhachis hirsute; bract glabrous, its limb subovate-elliptic, 1.5 mm. long, with a very short and thick pedicel containing gelified cells; stamens 2, anthers elliptic, 2-valvate.

PERAK: at Larut, 2800—3000 ft. alt., *King's Collector* 3228.

56. *PIPER SUBRUBRISPICUM*, C. DC. in Records Bot. Surv. Ind. VI. 23 (1912). About 90 cm. high. Branches rather long-hirsute, the spiciferous 3 mm. thick; collenchyma continuous, not libriform; a single central lysigenous canal. *Leaves* long-petioled; limb membranous when dry, copiously pellucid-dotted, glabrous above, hirsute underneath, up to 15 cm. long and 14 cm. wide; rounded-ovate, obtusely acuminate, the base equilateral, deeply cordate; 9-plinerved, the central nerve emitting 2 opposite ascendent nerves from 4.2 mm. above the base and having on each side of it 3 nerves free from the base; petiole about 6 cm. long, hirsute on the back, the sheath prolonged up to nearly 14.5 mm. above the base, the stipules densely pubescent outside. *Peduncle* hirsute, 6.3 mm. long. *Spike*: ♂ about 6 cm. long and 4.2 mm. thick when flowering, obtuse at the top, white and tinted dull-pink when living, blackish red when dry; rhachis glabrous; bract glabrous, its limb oblong-obovate, attenuate towards the lower end, with a short central pedicel; stamens 3, anthers reniform, 4-valvate, shorter than the oblong filaments.

PERAK: upper land, *Wray* 3579.

57. *PIPER LONGAMENTUM*, C. DC. in Records Bot. Surv. Ind. VI. 23 (1912). Scandent? Branches hirsute, drying brown, the spiciferous nearly 1 mm. thick, hirtillous; collenchyma in distinct laterally widened bundles, its inner zone libriform; a single central lysigenous canal. *Leaves* shortly petioled; limb membranous when dry, minutely pellucid-dotted, up to 10.5 cm. long and 3.5 cm. wide, oblong-ovate-lanceolate, acutely and rather long acuminate, equilateral and acute at the base, sparingly pubescent above and rather densely underneath; 5-plinerved, the central nerve emitting 2 opposite ascendent nerves from about 14.7 mm. above the base and having on each side

of it one ascendent nerve free from the base; petiole 6.3 mm. long, densely hirtillous. *Peduncle* nearly glabrous, 8.4 mm. long, slender. *Spike*: ♂ nearly 14 cm. long, 1.5 mm. thick; rhachis hirsute; bract glabrous, its limb rounded, nearly 1 mm. in diam.; stamens 2, anthers ovate, 4-valvate, nearly as long as the oblong filaments.

PERAK: at Larut. 1800--3000 ft., August, *King's Collector* 32071.

58. *PIPER SUBSESSILILIMBUM*, C. DC. in Records Bot. Surv. Ind. VI. 24 (1902). Scandent, cirrhi ramulose. Branches glabrous, drying brown, the spiciferous nearly 1 mm. thick; collenchyma libriform, in distinct laterally much widened bundles; a central and many peripheric lysigenous canals; very abundant dark brown cells in bark and pith. *Leaves* subsessile, glabrous; limb membranous when dry, minutely pellucid-dotted, up to 19 cm. long and 5 cm. wide, subobovate-elliptic-oblong, acutely and moderately long acuminate, the base attenuate, shorter on one side; pinninerved, the central nerve emitting on each side from nearly all its length about 20 thin subspreading nerves; petiole 3 mm. long of which 1 mm. between the sides of the limb, sheath basal. *Peduncle* glabrous, 8.4 mm. long. *Spike*: ♂ still juvenile, nearly 6 cm. long, up to 2 mm. thick, yellow when living; rhachis hirtillous; bract glabrous, its limb longitudinally elliptic with a short central pedicel.

PERAK: near Goping in dense jungle, August, *King's Collector* 578.

59. *PIPER OBOVANTHERUM*, C. DC. in Records Bot. Surv. Ind. VI. 24 (1912). Branches glabrous, dark brown when dry, the spiciferous 1 mm. thick, in branches 2 mm. thick; collenchyma libriform, in distinct bundles; a single central lysigenous canal. *Leaves* moderately long-petioled, glabrous; limb membranous when dry, elliptic, up to 14 cm. long and 9 cm. wide; elliptic, acutely acuminate, the base subrounded slightly longer on one side; 7-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from nearly 12 mm. above the base, and having on each side of it 2 ascendent nerves free from the base; petiole 12 mm. long of which 2 mm. between the sides of the limb, sheath basal. *Peduncle* glabrous, nearly 19 mm. long, very slender. *Spike*: ♂ about 52 mm. long and nearly 1 mm. thick when flowering; rhachis hirtillous; bract adnate, obovate-oblong, subattenuate at the lower end, obtuse at the apex, minutely ciliate at the margins otherwise glabrous, 2.5 mm. long, up to 1 mm.

wide; stamens 3, anthers obovate, 4-valvate, a little longer than the oblong filaments.

PERAK: Government hill, March, *Ridley* 2732.

Perhaps the ♂ of *P. Zuccarinii*, C. DC. in Prodr. XVI. 1, 365.

60. *PIPER ARGYRITES*, Ridl. MSS. ex C. DC. in Records Bot. Surv. Ind. VI. 25 (1912). Branches glabrous, drying brown, the spiciferous up to 1.5 mm. thick; collenchyma continuous, sparsely libriform; a single central lysigenous canal. *Leaves* moderately petioled, glabrous; limb firm when dry, minutely pellucid-dotted, up to 18 cm. long and to 6 cm. wide; oblong-ovate, acutely acuminate, the base rounded and slightly inequilateral; 7-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from 15 mm. above the base and having on each side of it 2 nerves free from the base, the internal ascendent the external subascendent much thinner and shorter than the others; petiole 10 mm. long, 2 mm. of which between the sides of the limb, sheath prolonged up to the middle of the petiole. *Peduncle* glabrous, 25 mm. long. *Spike*: ♂ 8 cm. long and 3 mm. thick when nearly flowering; rhachis hirsute; bract glabrous, obovate, adnate to the rhachis, up to 1.5 mm. long; stamens 2, anthers reniform, 4-valvate, filaments of same width as the anthers.

SELANGOR: Gua Batu, December, *Ridley* 8176; Ginting Bidai, May, *Ridley* 7611.

61. *PIPER CLYPEATUM*, Wall. Cat. 6655 A and B (1828). Stem creeping, rooting from the nodes; collenchyma continuous, mainly libriform, a single row of intramedullary bundles; a single central lysigenous canal. *Leaves* very shortly petioled; limb rigid-membranous when dry, pellucid-dotted, glabrous above, pubescent underneath, round or ovate-rounded cordate at the base, 11.5–15 cm. diam. *Spikes* unknown. C. DC. in Prodr. XVI. i. 378; Hook. f. Fl. Br. Ind. V. 96 and 537. *P. obtusissimum* Miq. Syst. Pip. 337. *P. manillanum*, Miq. l. c. 339.

PENANG, SINGAPORE: *Wallich*.—DISTRIB. Assam, Manilla.

SECT. II.—MULDERA, Hook. f. Fl. Br. Ind. V. 79, *emend.*

(Sect. SCHIZONEPHROS, C. DC. in Prodr. XVI. 1. 24).

Spikes oppositifolious. Bracts adnate to the rhachis except at their lower and upper ends where they are connate into a receptacle containing stamens or ovaries. Flowers unisexual. Stamens 2–10

in a single or in a double transverse row. Ovary free, solitary or 2—4 free ovaries in a transverse row.

- 1°. Receptacle glabrous outside, pubescent inside:
 - Male and female receptacles sessile, much condensed, elliptic, bilabiate, the female receptacle containing a single ovary .. 62. *P. pentandrum*.
 - Male receptacle sessile, distant, elliptic, bilabiate 63. *P. flavimarginatum*.
 - Female receptacle subsessile, rounded, containing a single ovary 64. *P. firmum*.
- 2°. Receptacle pubescent outside and inside:
 - Male receptacle stipitate, rounded, 3—5-androus 65. *P. Maingayi*.
 - Male receptacle elliptic, bilabiate, 2-androus 66. *P. rarispicum*.
 - Male receptacle reniform, bilabiate, 3-androus 67. *P. Schizonephros*.
 - Female receptacle sessile, elliptic, bilabiate, containing 3—4 ovaries .. 68. *P. polygamum*.
- 3°. Species insufficiently known 69. *P. pachyphyllum*.

62. *PIPER PENTANDRUM*, C. DC. in Records Bot. Surv. Ind. VI. 25 (1912). Scandent. Branches glabrous, dark brown when dry, the spiciferous 2 mm. thick; collenchyma libriform in distinct laterally widened bundles; a single central lysigenous canal or none; a circle of sclerous cells tightly surrounding the peripheric fibro-vascular bundle. *Leaves* glabrous, moderately long-petioled; limb coriaceous, the upper ones 9—12.5 cm. long, 3.5—5 cm. wide, the lower up to 12.5 cm. long and 7.5 cm. wide; elliptic-lanceolate, acutely acuminate, the base equilateral, acute; 7-plinerved, the central nerve emitting 2 opposite or alternate nerves the uppermost from 10.5—12.5 mm. above the base, and having on each side of it 2 ascendent nerves free from the base; petiole about 10.5 mm. long, sheath basal. *Peduncles* glabrous, as long as the petiole. *Spike*: ♂ about 27 mm. long and 3 mm. thick, densely floriferous; rhachis glandular-asperulate when young, later glabrous; receptacles sessile, much condensed, elliptic, bilabiate, glabrous outside, hairy inside, woody; stamens 5, rarely 6, anthers ovate, 4-valvate, shorter than the oblong filaments: ♀ about 27 mm. long and 4 mm. thick; ovary free, glabrous, ovate; stigmas 3, elliptic-acute. *Berry* globose, 5 mm. in diam.

PERAK: upper land, at 300 ft., Wray 3655; Scortechini 114.

Var. *β. magnifolium* C. DC. l. c. Branches thicker; collenchyma libriform, continuous or nearly so; many peripheric lysigenous canals; no sclerose cells round the peripheric fibro-vascular bundles;

limb elliptic, 12 cm. long 7.5—10 c.m. wide; petiole, peduncle and female spike nearly 26 mm. long.

PERAK: *Scortechini* 779.

63. *PIPER FLAVIMARGINATUM*, C. DC. in Records Bot. Surv. Ind. 26 (1912). Branches glabrous, drying brown, the spiciferous 2 mm. thick; collenchyma libriform, continuous; a central and several peripheric lysigenous canals; in branches 4 mm. thick there is a continuous zone of sclerosed cells tightly surrounding the peripheric fibro-vascular bundles. *Leaves* moderately petioled, glabrous; limb elliptic, acutely acuminate, acute and inequilateral at the base, nearly 12 cm. long and 8 cm. wide; 7-plinerved, the central nerve emitting on each side 2 ascendent nerves, the uppermost from about 23 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole 14.8 mm. long with 6.3 mm. between the sides of the limb, sheath basal. *Peduncle* glabrous nearly 26 mm. long. *Spike*: ♂ 6.3 cm. long; rhachis glabrous receptacles subsessile, loose, elliptic, bilabiate, glabrous outside hirsute inside; stamens 8, in a single row, anthers ovate, 4-valvate, shorter than the oblong filaments.

SINGAPORE: at Chan-Chu-Kang, *Ridley* 3772?; at Bukit Timah, *Ridley* 6425.

64. *PIPER FIRMUM*, C. DC. in Prodr. XVI. 1. 242. Scandent. Branches glabrous, reddish-fuscescent when dry, the spiciferous about 2 mm. thick; collenchyma libriform, in distinct bundles; a central and many peripheric lysigenous canals; sclerosed cells surrounding the masses of phloem of the peripheric fibro-vascular bundles. *Leaves* moderately petioled, glabrous; limb coriaceous, about 7.9 cm. long and 3 cm. wide, elliptic-lanceolate, acute at the top, the base acute, equilateral or slightly inequilateral; 5—6-plinerved, the central nerve emitting 2—3 ascendent nerves, the uppermost from near the base and having on each side of it one ascendent nerve free from the base; petiole 8.5 mm. long with basal sheath. *Peduncle* glabrous, 12.5 mm. long. *Spike*: ♀ nearly 4 cm. long; rhachis glabrous; receptacle sessile, rounded, flattened when adult, glabrous outside, hirsute with adpressed hairs inside. *Berry* globose, glabrous, 5 mm. in diam., brown when dry. *Muldera firma*, Miq. in Ann. Mus. Bot. Lugd.-Bat. V. 140.

PERAK: Tapa, *Wray* 1281.—DISTRIB: Java, Herb. Bogor. *Kurz* 1290; Sumatra, *Korthals*.

Differs from *Korthals*' specimen only by the presence of peripheric lysigenous canals.

65. *PIPER MAINGAYI*, Hook. f. Fl. Br. Ind. V. 80 (1885). Branches glabrous, fuscous when dry, the spiciferous 1.5 mm. thick; collenchyma libriform in distinct bundles; several peripheric lysigenous canals; a continuous zone of sclerosed cells tightly surrounding the peripheric fibro-vascular bundles. *Leaves* moderately long-petioled, glabrous; limb thickly coriaceous, 10.5—13 cm. long, 5.3—6.5 cm. wide, elliptic-lanceolate, the base equilateral; 5-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from 3.9—5.5 cm. above the base, and having on each side of it one ascendent nerve free from the base; petiole up to 8.5 mm. long, sheath basal. *Peduncle* a little longer than the petiole, finely tomentose as are the rhachis and receptacles. *Spike*: ♂ nearly 42 mm. long, densely velutino-puberulous; the receptacles stipitate, loose, rounded, 1.5 mm. in diam., densely velutino-puberulous outside and inside, 3—5-androus; anthers ovate, 4-valvate, shorter than the filaments: ♀ 5.3 cm. long; receptacles sessile, rounded, densely velutino-puberulous outside and inside. *Berry* globose, about 6 mm. in diam.

SINGAPORE AND MALACCA: *Maingay* K.D. 1334, 1336.

The leaves are like those of *P. firmum*, but the spikes, by their pubescence, are very different from those of that species.

66. *PIPER RARISPICUM*, C. DC. in Records Bot. Surv. Ind. VI. 27 (1912). Branches glabrous, blackish when dry, the spiciferous 1 mm. thick; collenchyma continuous, libriform; a central and many peripheric lysigenous canals. *Leaves* moderately long-petioled, glabrous; limb 10.5—13 cm. long, 5.8—7 cm. wide; ovate, acutely and rather shortly acuminate, the base rounded and slightly inequilateral; 7-plinerved, the central nerve emitting 2 ascendent nerves the uppermost from 14.5—16.5 mm. above the base, and having on each side of it 2 nerves free from the base, the inner ascendent the outer subascendent, much shorter and thinner than the others; petiole 14.5—19 mm. long. *Peduncle* slender, glabrous, 29 mm. long. *Spike*: ♂ rarely seen, 5.9 cm. long; rhachis puberulous; receptacles stipitate, elliptic, velutino-pubescent outside and inside, diandrous; anthers obovate, 4-valvate, about 0.5 mm. long, the oblong filament of same length.

PENANG: road to Sungei Penang, at 1500 ft., *Curtis* 1771.

67. *PIPER SCHIZONEPHROS*, C. DC. in Prodr. XVI. 1. 241 *exclud.* spec. Jungh. Branches glabrous, dark brown when dry, the spiciferous nearly 1 mm. thick; collenchyma libriform, in distinct bundles, a central and several peripheric lysigenous canals; a thick circle of sclerosed cells tightly surrounding the peripheric fibro-vascular bundles. *Leaves* glabrous; limb coriaceous, 8—13 cm. long, 2.6—5 cm. wide; elliptic-lanceolate, acute at both ends, the base equilateral; 5-plinerved, the central nerve emitting 2 ascendent alternate nerves the uppermost from about 26 mm. above the base and having on each side of it one ascendent nerve free from the base; petiole about 8.5 mm. long, sheath basal. *Peduncle* glabrous, nearly 18 mm. long, slender. *Spike*: ♂ 15.5—18.5 cm. long; rhachis very slender, hairy; receptacles stipitate, reniform; about 8-androus, filaments short, anthers small, rounded, 4-valvate, shorter than the filaments. Hook f. Fl. Br. Ind. V. 79. *Schizonephros glaucescens*, Griff. Notul. IV. 363.

PENANG: Government hill, *Curtis* 1771. MALACCA: at Ching, *Griffith* 4400.

68. *PIPER POLYGYNUM*, C. DC. in Records Bot. Surv. Ind. VI. 27 (1912). Large climber, stem up to 13 cm. thick. Branches glabrous, drying brown, the spiciferous 7 mm. thick; collenchyma in these 3 mm. thick libriform in distinct bundles, no lysigenous canal; a circle of sclerose cells tightly surrounding the peripheric fibro-vascular bundles. *Leaves* moderately long-petioled, glabrous; limb coriaceous when dry, elliptic, shortly and acutely acuminate, the base attenuate and slightly inequilateral; about 13 cm. long and 6.5 cm. wide; penninerved, the central nerve emitting on each side 3 alternate and ascendent nerves, the uppermost from 29 mm. above the base; petiole 14.5 mm. long of which 2 mm. between the sides of the limb, sheath basal. *Peduncle* glabrous, 29 mm. long, slender. *Spike*: ♀ nearly as long as the limb, rhachis minutely puberulous; receptacles rather distant, sessile, transversely elliptic, minutely velutinous outside, densely hirsute inside, containing 3—4 ovaries of which only one maturing; ovaries free, sessile, ovate, velutinous at the top; stigmas 3, linear. *Berry* glabrous, globose, nearly 5 mm. in diam.

PERAK, at 3500 ft., *Wray* 4068. SUNGEI UJONG: *Stephenson*.

69. *PIPER PACHYPHYLLUM*, Hook. f. Fl. Br. Ind. V. 80 (1888). Glabrous. *Leaves* moderately long-petioled; limb probably fleshy when living, thickly coriaceous and pale yellowish when dry; elliptic,

acute or acuminate, 10·5—15 cm. long, 5·5—10·5 cm. wide; 5—7-plinerved, the central nerve emitting 2 nerves and having on each side 1—2 nerves free from the base; petiole 6·3—12·6 mm. long. *Peduncle* much longer than the petiole, very stout; rhachis glabrous; bracts forming a ring round the base of the smooth globose berry (*ex* Hook. f. l.c.).

MALACCA: *Griffith*.

SECT. III.—HECKERIA, Hook f. Fl. Br. Ind. V. 195.

(Sect. POTOMORPHE C. DC. in Prodr. XVI. i. 133).

Spikes axillary or condensed at the top of an axillary branchlet. Bract hypopeltate. Flower bisexual. Stamens 2-3. Ovary free, stigmas 3.

70. PIPER UMBELLATUM, Linn. Sp. Pl. 43, var. *subpeltatum* C. DC. in Donn.-Sm. Enum. VI. 339. Shrub 0·9—2 m. high. Stem and branches glabrous, the spiciferous minutely glandulose, about 7 mm. thick; collenchyma not libriform, in distinct and laterally much widened bundles; 2 rows of intramedullary bundles, a single lysigenous canal. *Leaves* very long petioled; limb membranous when dry, copiously reddish-pellucid-dotted, velutino-puberulous on both surfaces; about 16—18 cm. long and up to 30 cm. wide, rounded-reniform, acutely and very shortly acuminate, the base equilateral, deeply cordate, 17-plinerved, the central nerve emitting 2 pairs of ascendent nerves, the uppermost from up to 26 mm. above the base, and having on each side of it 6 nerves diverging from the base; petiole velutino-puberulous on the back, 24—30 cm. long, sheath prolonged up to the middle of the petiole. Spiciferous branch 3—4 cm. long, minutely puberulous, bearing 5—7 peduncles about 12 cm. long in the axils of oblong-acuminate and early deciduous scales. *Spikes* up to 8 cm. long and 3 mm. thick; rhachis glabrous; limb of bract triangular, ciliate at the margin, with a central glabrous pedicel; stamens 2 on the extreme base of the ovary; anthers deciduous, very small, nearly reniform, 4-valvate. *Berry* obovate, trigonous, about 0·75 mm. long, glabrous; stigmas 3, linear, sessile, very short. *P. subpeltatum*, Willd. Sp. Pl. I. 166; C. DC. in Prodr. l.c. 333; Hook f. Fl. Br. Ind. V. 95. *Heckeria subpeltata*, Kth. in Linn. XIII. 571. *Potomorphe subpeltata*, Miq. Syst. Pip., 213, Illustr. 29, tab. 26, in Linn. XX. 129, Pl. Jungh. I. 116, Fl. Ind. Bat. I. ii. 437 and Suppl. 186; in Linn. XXI. 481; Wight Ic. t. 1925.

PENANG: *Wallich* 6638. PERAK: Kuala Weh, *Wray* 348; Larut, *King* 1890; Waterloo, *Curtis* 2698; *Scortechini*; *Wray* 2467. SELANGOR: Bidai, *Ridley* 7612.—DISTRIB. India (Deccan Peninsula from the Concan hills at 5000 ft. altitude southwards, Nilgiris), Ceylon, Malay Archipelago, Philippine Islands, Tropical America, West Indies, Tropical Africa.

SECT. IV.—ENCKEA, C. DC. in Prodr. XVI. i. 234, *emend.*

Spikes oppositifolious. Bract squamiform, more or less cucullate. Flower bisexual. Stamens 5—6, rarely 4. Ovary free, stigmas 3—5.

71. PIPER LAPPACEUM, C. DC. in Flor. Ind.-Chin. V. 68. Root fibrous, stem erect, 30—35 cm. high, glabrous; collenchyma continuous, not libriform; no lysigenous canal. *Leaves* moderately long petioled, glabrous; limb membranous when dry, pellucid-dotted; 10 cm. long, 6 cm. wide; ovate, acutely acuminate, the base inequilateral, cordate; 5—7-nerved, the 3 central nerves stouter than the others; petiole about 17 mm. long, of which 2 mm. between the sides of the limb, sheath more or less prolonged above the base, stipules attenuate and decurrent at the top. *Peduncle* glabrous, nearly 70 mm. long. *Spike* 60 mm. long; rhachis slender, minutely glandulose; flowers distant, pedicellate; bract ovate, 1 mm. long; pedicel of the flower 3 mm. long; stamens 6, filaments very short, anthers oblong; ovary rounded, covered with glochidiate processes; style terminal, carinose, glabrous; stigmas 4, ovate-linear. *Berry* globose, 3 mm. in diam, bristling with glochids, these about 3 mm. long. *P. Zippelia*, C. DC. in Prodr. XVI. i. 256. *Zippelia begoniifolia*, Bl. in Roem. Schult. Syst. VII, 1614, 1651; Miq. Syst. Pip. 258, Illustr., 58, tab. 92 f.c. *Zippelia lappacea*, Benn. Pl. Jav. Rar. 76, tab. 16.

PERAK: at Kwala Dipang, *Ridley* 9584; Ulu Batang Padang, *Ridley* 13786.—DISTRIB.: Tonkin, Java, Sumatra.

Family CIV. PROTEACEÆ.

Trees or shrubs, rarely herbs. *Leaves* usually coriaceous; alternate or scattered, rarely opposite or verticillate; entire, toothed or pinnatisect; stipules none. *Flowers* capitate, spicate, racemose or rarely solitary; hermaphrodite or by abortion polygamous or dioecious, regular or irregular; bracts small, caducous or nearly obsolete,

sometimes imbricate, persistent and hardened in fruit, forming a cone; bracteoles 0—2. *Perianth* inferior, segments 4, at first valvately connate in a tube with gibbous base at length more or less separating with free recurved tips. *Stamens* 4, inserted on or opposite to the perianth-segments; anthers erect, the connective continuous with the filaments; cells 2, introrse, dehiscence longitudinal. *Disk* consisting of 4 hypogynous scales, free or connate, alternating with the filaments, sometimes 0. *Ovary* superior, sessile or stipitate, 1-celled, often oblique; style terminal, the tip thickened; stigma terminal or lateral; ovules solitary or in pairs or many, biseriate. *Fruit* a nut or drupe, indehiscent or ultimately opening on the inner edge or at the tip, or a follicle or capsule with often thickly coriaceous valves. *Seeds* solitary or in pairs or few; testa membranous or coriaceous, sometimes winged; albumen 0; cotyledons compressed or fleshy, often unequal; radicle short, inferior or lateral. **DISTRIB.** Genera about 50, species very many, chiefly Australian or South African, a few only in tropical Asia, Africa and America, none in Europe, N. Asia or N. America.

1. *HELICIA*, Lour.

Trees or large shrubs. *Leaves* alternate, entire, toothed or rarely pinnatisect. *Flowers* in terminal and axillary racemes, hermaphrodite, regular, pedicelled, usually in pairs; bracts small, caducous; bracteoles minute. *Perianth*—tube slender, limb narrow, ovate or oblong, straight, segments revolute when in flower. *Stamens* 4, anthers oblong, connective produced in an apiculus. *Hypogynous scales* free or connate in a cup-shaped disk. *Ovary* sessile; style slender; stigma terminal; ovules 2, basal or lateral, attached below the middle. *Fruit* a subglobose hard nut. *Seeds* 1—2, subglobose or hemispheric; testa rugose or veined; cotyledons fleshy. **DISTRIB.** Tropical Asia and Australia.

Racemes glabrous; hypogynous scales connate or completely forming a cup; bracts and bracteoles minute.

Leaves petioled.

Petiole up to 1 cm. long; leaves subcoriaceous, entire or distantly serrated in the upper half; perianth moderately slender, thick

.. 1. *H. attenuata*.

Petiole 2—3 cm. long; leaves firmly coriaceous, entire; perianth stout, very thick

.. 2. *H. petiolaris*.

Leaves sessile or nearly so, the margins of the blade decurrent quite to the base.

Leaves entire; hypogynous scales in a cup;
perianth thick 3. *H. Kingiana*.

Leaves coarsely serrate in the upper half; perianth
thin 4. *H. robusta*.

Racemes pubescent, tomentose or villous; hypogynous
scales free.

Racemes densely rufous-pubescent or velvety; leaves
entire or nearly so.

Leaves rufous-pubescent beneath, petioles 3—4
cm. long; racemes 15—20 cm. long; bract and
bracteoles ovate, minute 5. *H. rufescens*.

Leaves plumbeous beneath, nearly glabrous,
petioles 1—1.5 cm. long; racemes dense, short;
bract and bracteoles linear, conspicuous .. 6. *H. velutina*.

Leaves glabrous, yellowish when dry, petiole 1—2
cm. long; racemes slender, 5—10 cm. long;
bract and bracteoles acuminate, short .. 7. *H. excelsa*.

Leaves glabrous, nearly black when dry, petiole
about 1 cm. long; racemes slender, short; bract
and bracteoles rather short 8. *H. Scortechinii*.

Racemes glabrescent; bracts and bracteoles short.

Racemes 10—15 cm. long; leaves yellowish when
dry, entire; leaf petiole over 1 cm. long .. 7. *H. excelsa*.

vars. *salicifolia*
and *Forbesii*.

Racemes 15—20 cm. long; leaves prominently
serrate, olive-brown when dry, under-surface
yellowish; leaf petiole under 1 cm. long .. 9. *H. Curtisii*.

1. *HELICIA ATTENUATA*, Bl. in Ann. Sc. Nat. Ser. 2. 1. 216
(1834). A large shrub or low tree reaching a height of 6—9 m. with a
diam. of up to 30—40 cm.; branches spreading; branchlets pale brown,
moderate-sized, smooth; all parts quite glabrous. *Leaves* subcoriaceous;
obovate or oblanceolate, acute or acuminate at apex, long attenuate
at base; olive-green or reddish when dry, the upper surface slightly
shining and somewhat bullate; margins entire or with a few distant
serratures in the upper half; 12—30 cm. long, 5—11 cm. broad;
midrib slender, raised on both surfaces; main nerves 8—10 pairs,
irregular, curving upwards and the upper ones interarching; secondary
nerves and transverse nervules irregularly but prominently netted as is
the reticulation; petiole thickened at base, up to 1 cm. long, bordered
above by the decurrent margins of the blade. *Flowers* pale yellow, in
pairs or single, rather distant, from the rhachis of a cylindrical

raceme reaching 20—30 cm. in length, from the axils of fallen leaves of the previous year's wood; pedicels at right angles to the rhachis, 3—5 mm. long; bract and bracteoles very small, acute, caducous; perianth rather thick, in bud linear-clavate, 2—3 cm. long; hypogynous scales connate, truncate, dentate, 1 mm. long. *Stamens* 4; anthers oblong, 2-celled; filaments very short, connective produced in a blunt apiculus. *Ovary* glabrous, style as long as the perianth, stigma ellipsoid-clavate. *Fruit* ovoid, 3—4 cm. long, 2—3.5 cm. in diam., narrowed at both ends, obscurely 6-angled, the thickened pedicel 3 mm. in diam. *Seeds* 1—2, subglobose, testa thinly leathery; cotyledons hemispheric. Benn. in Horsf. Pl. Jav. Rar. 83; Meissn. in DC. Prodr. XIV. 439; Miq. Fl. Ind. Bat. I. i. 985; Hook. f. Fl. Br. Ind. V. 190; Koord. & Val. Bijdr. V. 313. *Rhopala attenuata*, Jack in McLell. Calc. Journ. IV. 352; and in Mal. Misc. I. 2. 10; Hook. Bot. Misc. II. 65; Wall. Cat. 1040; Walp. Ann. I. 592, V. 313. *R. moluccana*, Roxb. Hort. Beng. 83; Fl. Ind. Ed. Carey and Wall. I. 364 and Fl. Ind. I. 361 non Br. nec Jack. *R. racemosa*, Roxb. M.S. in Herbb. Linn. Soc. Lond. and Kew.

PENANG: Jack (Wallich 1040!); at Tulloh Bahang, Curtis 1181!; at Waterfall, Curtis 2765!; Ridley 12683!. PERAK: Scortechini 195!, 196!, 795!; at Batu Togo, Tupai, Waterfall Hill, etc. Wray 2159!, 2671!, 3144!, 3156!, 4052!; in various places from sea level to 600 m. alt., King's Collector 764!, 3383!, 4301!, 4594!, 5931!, 8496!, 8795!. SELANGOR: at Kwala Lumpur, Curtis 2372!; at Dusum Tua, Ridley!. PAHANG: at Tahan river, Ridley!. JOHORE: at Mount Austin, Ridley 13008!.—DISTRIB. Java (Koorders).

2. *HELICIA PETIOLARIS*, Benn. in Horsf. Pl. Jav. Rar. 84 (1838). A tree reaching 18—20 m. in height and 45—60 cm. in diam. of stem; branches spreading; branchlets stout, smooth, grey, uppermost nearly black and angled; all parts glabrous. *Leaves* firmly coriaceous; broadly obovate, obtuse or obtusely acute at apex, long-cuneate at base, rarely slightly lobed; upper surface shining, olive-green, lower also somewhat shining and purplish when dry; margins entire; 10—35 cm. long, 5—15 cm. broad; midrib stout, raised on both surfaces; main nerves 7—9 pairs, somewhat impressed above, spreading, curving upwards to join in diminishing loops near the margin; secondary nerves and transverse nervules irregularly netted, all nerves and reticulation slightly raised on both surfaces; petiole 2—3 cm. long, channelled above by the decurrent margins of the blade, the base enlarged. *Flowers* cream-

coloured, geminate, on bifid pedicels from the stout angular rhachis of an elongated axillary or lateral raceme reaching 20—30 cm. in length; pedicels at right angles to the rhachis, 4—6 mm. long, the two branches slightly shorter; bract and bracteoles minute, acute, caducous; perianth very thick, coriaceous, in bud linear-clavate, 2—2.5 cm. long, the limb of the lobes elliptic, the lobes spirally recurved in flower; hypogynous scales connate, truncated, toothed, 1 mm. long. *Stamens* 4; anthers oblong, 2-celled, 3 mm. long; filaments very short; connective produced in an ovate apiculus. *Ovary* glabrous; style nearly as long as the perianth lobes; stigma clavate, sulcate. *Fruit* depressed-ovoid, shortly pointed, 2 cm. long, 2.5 cm. in diam., smooth; pedicel little thickened, 2 mm. in diam. *Seed* subglobose, testa membranous, cotyledons hemispheric. Meissn. in DC. Prodr. XIV. 438; Miq. Fl. Ind. Bat. I. i. 983; Hook. f. Fl. Br. Ind. v. 190. *Rhopala moluccana*, Jack in McClell. Calc. Journ. 208, Mal. Misc. I. ii. 10; Hook. Bot. Misc. II. 65; Wall. Cat. 1041 non Br. nec Roxb.

PENANG: Cultivated, *Jack* (Wallich 1041!). PERAK: at Goping, *Scortechini* 1977!; in various places in forest up to 250 m. alt., *King's Collector* 4641!, 5438!, 8442!, 8687!. SELANGOR: 15th mile Pahang track, *Ridley* 8499!; at Kwala Lumpur, *Goodenough* 10472!. SINGAPORE: *Ridley* 3625!, 4695!, 4696!, 6257!, etc; at Changi Reserve, *Goodenough* 141!

3. *HELICIA KINGIANA*, Prain in Kew Bull. 342 (1912). A tree, reaching a height of 15—20 m. and 30—45 cm. in diam. of stem, all parts quite glabrous; branches spreading; branchlets stout, smooth, dark grey to nearly black, uppermost sharply angled. *Leaves* coriaceous; obovate or elliptic-obovate, rounded or shortly obtusely sometimes emarginately acuminate at apex, cuneately attenuate at base; upper surface light green, dark olive-green when dry, lower purplish brown when dry, both surfaces dull; margins entire, recurved; 15—25 cm. long, 6—11 cm. broad; midrib stout, raised on both surfaces; main nerves 10—12 pairs, the lowest 1—2 pairs very oblique from close to the base, the rest more widely curving and joining in gradually diminishing loops; transverse nervules prominent, irregular, angularly branching and enclosing an angular areolate reticulation; petiole none or very short, the margins of the blade extending to the enlarged base. *Racemes* stout, stiff, singly from the axils of the leaves or of fallen leaves, up to 30 cm. long; pedicels stout, 4—5 mm. long, bearing two flowers on branches 4.5—6 mm. long; bract and

bracteoles minute, acute, caducous; perianth in bud 3.5—4 cm. long, thick, the apex angular; hypogynous scales connate in a truncate slightly dentate cup 1—1.5 mm. long. *Stamens* with elliptic anthers, the connective broad, its apiculus blunt, cells 3—3.5 mm. long; filaments broad, 2 mm. long. *Ovary* ovoid, glabrous; style and clavate stigma as long as perianth. *Fruit* globose or ovoid, somewhat pointed at both ends, ridged on one side, 3—4 cm. long, 2—3 cm. broad; pericarp smooth, 2 mm. thick. *Seed* conform to the drupe; testa membranous; cotyledons 2—4, granular.

PERAK: in open forest, from the low ground to the tops of hills 250—300 m. alt. near Larut, *King's Collector* 3714!, 3881!, 6217!; at lower camp, Gunong Batu Putih, 1200 m. alt., *Wray* 983!, 1160!.

4. *HELICIA ROBUSTA*, Wall. Cat. 2702 (1820). A small tree reaching 8 m. in height and 15 cm. in diam. of stem; branchlets smooth with greyish-brown bark; all parts quite glabrous except sometimes the rhachis of the racemes which is slightly puberulous. *Leaves* subcoriaceous; obovate or oblanceolate, obtuse or obtusely acute or even acuminate at apex, cuneately narrowed in the lower half, finally rounded or subcordate; upper surface dull or shining, greenish when dry, lower dull dark brown; margin coarsely serrate, the lower part often entire; 15—25 cm. long, 6—12 cm. broad; midrib stout, raised on both surfaces; main nerves 10—12 pairs, irregular, usually obliquely curved to the margin; transverse nervules irregularly netted, prominent; petiole none or very short and much thickened. *Racemes* axillary, up to 30 cm. long, the rhachis moderately stout, angled; pedicels short, dividing near the base into two usually of different lengths, in all nearly 5 mm. long; bract and bracteoles minute, acute; perianth thin, in bud linear clavate, 2—3 cm. long, the limb of the lobes elliptic, recurved, the lobes spirally recurved in flower; hypogynous scales more or less connate, truncate, denticulate, 1—1.5 mm. long. *Stamens* 4; anthers oblong, 3 mm. long; filaments very short; connective produced in a rounded apiculus. *Ovary* glabrous, style nearly as long as the perianth lobes; stigma clavate, sulcate. *Fruit* obliquely globose, apiculate, obscurely 4—6-ribbed, reaching 2.5—3 cm. in diam., smooth; fruiting pedicel very short, 4 mm. in diam. *Seed* globose, testa very thin, cotyledons hemispheric. Bl. in Ann. Sc. Nat. Ser. 2. i. 220; Benn. in Horsf. Pl. Jav. Rar. 83; Meissn. in DC. Prodr. XIV. 440; Miq. Fl. Ind. Bat. I. i. 986; Kurz For. Fl. II. 311; Hook.

f. Fl. Br. Ind. v. 191; Brandis Ind. Trees 543. *H. macrophylla*, Wall. Cat. 3661. *H. javanica*, Bl. in Ann. Sc. Nat. Ser. 2. i. 217; Benn. l.c. 83, t. 18; Meissn. l.c. 440; Miq. l.c. 986; Koord. & Val. Bijdr. V. 306. *H. castaneæfolia*, Meissn. l.c. 441. *Helittophyllum javanicum*, Blume Bijdr. 652. *Rhopala robusta*, Roxb. Fl. Ind. ed. Carey & Wall. I. 366 and Fl. Ind. I. 363; Wight Ic. t. 191. *R. glabrata*, Wall. Cat. 1039.

MALACCA: Griffith K. D. 4367!; Cuming 2338!; Maingay K. D. 1309!, 1311!; at Sungei Udang, Derry 523!. SELANGOR: at Kwala Lumpur, Ridley 10225!.—JOHORE: at Bukit Tana Abang, Lake & Kelsall 4010!. DISTRIB: India (Assam and Khasia), Burma, Java, (Forbes 377!, 670!, 2731! etc.), Sumatra (Forbes 2212!).

5. *HELICIA RUFESCENS*, Prain in Kew Bull. 342 (1912). A large tree reaching a height of 18—24 m. and 60 cm. or more in diam. of stem; branches spreading; branchlets stout, dark ashy grey, the uppermost densely dark rufous-tomentose. Leaves subcoriaceous; obovate or broadly oblanceolate, acute or very shortly acuminate at apex, long cuneate at base; upper surface dark green, dull olive-green when dry, glabrous except on the midrib and nerves when young, lower reddish brown, densely rufous—pubescent when young, gradually glabrescent when older; margin entire; 15—30 cm. long, 6—11 cm. broad; midrib prominent, raised on both surfaces, crispedly brown-puberulous above; main nerves 16—20 pairs, close and parallel and straight in the lower, more distant and curved in the upper half and there joining in angular loops; transverse nervules irregular, angled and branched; reticulation irregular, prominent; petiole 3—4 cm. long, thickened at base, densely rufous-tomentose. Racemes single or in pairs from the axils of the leaves or of fallen leaves, densely dark rufous—pubescent, 15—20 cm. long; pedicel short, 1 mm. long, bearing two flowers on branches 2 mm. long; bract and bracteoles ovate, minute; perianth in bud 10—12 mm. long, the lobes in flower very much spirally curved, glabrous within; hypogynous scales free, obtuse, glabrous. Stamens with linear anthers 2.5—3 mm. long, the connective apiculus blunt; filaments slender, 1 mm. long. Ovary densely rufous-villous; style slender, including the cylindric grooved stigma as long as perianth. Fruit yellowish-brown, subglobose, flattened on both sides, slightly ridged on the outer, apex and base acute, 3 cm. long, 2.5 cm. broad, 1.5 cm. thick, rufous-tomentose, gradually becoming glabrescent; pericarp 2—3

mm. thick. *Seed* conform to the fruit, testa membranous; cotyledons fleshy, channelled across the middle.

PERAK: in open forests about Larut and Thaiping, on hills from 150—450 m. alt., *King's Collector* 4213!, 4939!, 5096!, 8504!; at Waterfall Hill and Tapai, *Wray* 2083!, 3084!.

6. *HELICIA VELUTINA*, Prain in Kew Bull. 343 (1912). A tree reaching a height of 15—20 cm. and 25—33 cm. in diam. of stem; branchlets stout, grey, striate, the uppermost minutely grey-puberulous. *Leaves* chartaceous; broadly oblanceolate, rather abruptly acuminate at apex, cuneate at base; upper surface bright green, olive green and shining when dry, glabrous, lower also somewhat shining, plumbeous, glabrous except a slight pubescence along the midrib; margin entire, recurved when dry; 10—20 cm. long, 4—7 cm. broad; midrib moderately stout, prominent on both surfaces; main nerves 14—16 pairs, impressed above, raised beneath, straight and parallel, interarching near the margin; secondary nerves and transverse nervules irregular, branched, enclosing an angular reticulation; petiole 1—1.5 cm. long, thickened at base, the upper part bordered by the decurrent margins of the blade. *Racemes* single or in pairs from the axils of fallen leaves on the past year's wood chiefly, up to 7 cm. long (bud—specimens only), densely rufous velvety; flowers densely congested, in pairs on very short pedicels or sessile, ascending; bract linear, 7—8 mm. long, bracteoles linear, 4—5 mm. long; perianth in bud shortly and thickly clavate, 5 mm. long, glabrous within; hypogynous scales minute, free, truncate, glabrous. *Stamens* with oblong nearly sessile anthers, the connective-apiculus short, thick. *Ovary* ovoid, glabrous; style thick, stigma clavate. *Fruit* not known.

PERAK: in open forest at Gunong Bubu, Larut⁹, 600—750 m. alt., *King's Collector* 7316!

7. *HELICIA EXCELSA*, Bl. in Ann. Sc. Nat. Ser. 2. i. 219 (1834). A large tree reaching 18—24 m. in height and 40—50 cm. in diam. of stem; bark grey, scabrous; branches spreading; branchlets rather slender, grey, the uppermost and innovations densely dark rusty-tomentose. *Leaves* coriaceous; obovate or oblanceolate, obtusely rather abruptly acuminate at apex, long cuneate at base; margins entire or rarely the upper part coarsely serrate; both surfaces glabrous, yellowish-green when dry, the upper shining; 10—15 cm.

long, 3—6 cm. broad; midrib slender, raised beneath; main nerves 6—8 pairs, irregular, raised on the upper surface, soon branching and irregularly anastomosing; reticulation irregular, prominent; petiole slender, 1—2 cm. long, the upper part bordered by the decurrent margins of the blade. *Flowers* yellowish-green, in pairs in axillary or terminal racemes 5—10 cm. long, densely dark rusty-villous; pedicels 1—2 mm. long, 2-flowered, branches 1—1.5 mm. long; bract acuminate, 1—2 mm. long, at the bases of the pedicels, bracteoles on the branches 1 mm.; perianth slender, 4—6 mm. long, clavate in bud; hypogynous scales 4, free, ovoid, glabrous, .5 mm. long. *Stamens* 4; anthers 1—2 mm. long, the connective rugose, produced in a short apiculus. *Ovary* ovoid, ferruginous-villous; style slender, as long as perianth; stigma clavate. *Fruit* ovoid, oblique, smooth, 10 mm. long, 7—8 mm. in diam.; pedicel slightly thickened, 3 mm. in diam. Benn. in Horsf. Pl. Jav. Rar. 84; Meissn. in DC. Prodr. XIV. 441; Kurz For. Fl. II. 312; Miq. Fl. Ind. Bat. I. i. 987; Hook. f. Fl. Br. Ind. V. 191. *Rhopala excelsa*, Roxb. Fl. Ind. I. 363 and ed. Carey & Wall. I. 365; Spr. Syst. Veg. I. 482. 11; Roem. & Sch. Syst. Veg. Mant. III. 285; Wight Ic. t. 190 (copied from Roxb.).

PERAK: on tops of low hills in open jungle near Goping and Ulu Bubong, 90—250 m. alt., *King's Collector* 5928!, 6100!, 10836!; near Gunong Bubu, *Scortechini* 774!. MALACCA: at Sungei Hudang, etc. *Goodenough* 1388! 1760!; *Derry* 456!, 530!. SINGAPORE: at Chenchukang, *Goodenough* 2759!; at Kranji, *Ridley* 6428!.—DISTRIB. India (Chittagong), Burma (Tenasserim).

Var. *salicifolia*. Innovations nearly glabrous. *Leaves* narrower, less abruptly and obtusely acuminate at apex, entire. *Racemes* longer, 10—13 cm. long, the rachis and perianth nearly glabrous, the bract and bracteoles longer; the hypogynous scales 1 mm. long, oblong. *Fruit* larger, nearly 2 cm. long, 10—12 mm. broad, blue-black when ripe. *H. salicifolia*, Presl. Epimel. Bot. 247 (1849); Meissn. in DC. Prodr. XIV. 439; Kurz For. Fl. II. 312. *H. excelsa* var. *edentula* Benn. in Horsf. Pl. Jav. Rar. 84.

PERAK: in dense jungle on low ground, Goping, *King's Collector* 691!, 6096!; at Simpang, *Wray* 2310!; at Gunong Haram Parah, *Scortechini* 687!. MALACCA: *Maingay* K. D. 1310!; at Sungei Hudang, *Derry* 1202!.—DISTRIB. Burma (Tenasserim, *Helper* 4366!)

var. *Forbesii*. Similar to the last, but the *leaves* much larger, 12—22 cm. long, 4—8 cm. broad; main nerves up to 10 pairs.

Racemes still more glabrous, longer, up to 15 cm.; perianth longer and more slender; bract broader.

PERAK: in open jungle on low ground near Larut, *King's Collector* 3392!.—DISTRIB. Sumatra (at Moeara Merg Kulem, 450 m. alt. *Forbes*, 3047 a!.)

8. *HELICIA SCORTECHINII*, Gamble in Kew Bull. 117 (1913). A tree?, branchlets smooth, pale brown, the youngest slightly puberulous. *Leaves* chartaceous; oblanceolate, abruptly caudate—acuminate at apex, cuneate at base; both surfaces dull, the upper nearly black when dry, glabrous, the lower reddish-brown with a few hairs scattered on the surface; margin shortly but closely serrate on the upper two-thirds, entire towards the base; 12—18 cm. long, 4—6 cm. broad; midrib slender, prominent beneath; main nerves 8—10 pairs curving towards the margin and there joined in angular loops, prominent beneath; transverse nervules irregular, branching, enclosing an irregular reticulation; petiole about 1 cm. long, the margins of the blade decurrent almost to its base. *Racemes* (young only) from the axils of fallen leaves, solitary or geminate, minutely ferruginous-hirsute; pedicels short, 2-flowered; bract ovate, acuminate, 2 mm. long; bracteoles similar, 1 mm. long; perianth in bud clavate; hypogynous scales free, ovate, glabrous. *Ovary* glabrous, style short, stigma cylindric clavate. *Fruit* not known.

PERAK: *Scortechini* 467!.

The specimens are in bud only and the description is taken almost entirely from that of *Father Scortechini*.

9. *HELICIA CURTISII*, Gamble in Kew Bull. 116 (1913). A tree reaching 6—9 m. in height; branchlets pale brown, smooth, glabrous. *Leaves* chartaceous; oblanceolate, acuminate, often obtusely, at apex, long-attenuate at base; both surfaces glabrous, olive-brown when dry, the lower rather paler and reddish; margins strongly serrate from the middle upwards; 12—18 cm. long, 4—6 cm. broad; midrib slender, prominent beneath; main nerves 8—10 pairs, prominent especially beneath, curving to near the margin and there more or less interarching; transverse nervules few, branching and enclosing the areolate reticulation; petiole under 1 cm. long, the margins of the blade decurrent nearly to its base. *Racemes* axillary, slender, 15—20 cm. long, the rhachis and pedicels minutely rusty-

puberulous when young, later glabrescent; pedicels slender, 2 mm. long, then bifid, the branches as long again; bract and bracteoles minute, caducous; perianth in bud clavate, slender, thin, 7—8 mm. long, the lobes oblong acute; hypogynous scales free, ovate, obtuse, 1 mm. long. *Stamens* 4; anthers oblong, connective apiculate; filaments short, flattened. *Ovary* ovoid, ferruginous-villous; style 5—6 mm. long, very slender; stigma narrowly cylindric. *Fruit* not known.

PENANG: at Penara Bukit, 450 m. alt., *Curtis* 3020!

Family CVII. LORANTHACEÆ.

Evergreen shrubs, rarely herbs, usually parasitic on the branches of trees; stems much-branched, often jointed. *Leaves* usually opposite sometimes alternate, coriaceous, entire, sometimes reduced to scales or absent; stipules none. *Flowers* regular or zygomorphic, hermaphrodite or unisexual, sometimes large and brightly coloured, sometimes inconspicuous; racemose, spicate, capitate or fascicled, usually bracteate and often with 2 or more bracteoles. *Calyx* adnate to the ovary; limb annular or cupular, truncate, entire or shortly toothed, sometimes none. *Petals* or perianth segments 3—8, valvate, free or more or less connate in a tube. *Stamens* as many as, and opposite to, the petals and more or less adnate to them; filaments slender or none; anthers basifixed or dorsifixed, opening by longitudinal slits or by rows of cells or by pores. *Ovary* inferior, 1-celled; usually without distinct placenta or ovule; style short or long; stigma simple or hardly lobed. *Fruit* a 1-seeded berry or drupe with fleshy pericarp and often viscid mesocarp. *Seed* solitary without distinct testa; albumen fleshy or absent; embryos 1, rarely 2, with distinct hypocotyl and 2 or more cotyledons; radicle superior. **DISTRIB.** Chiefly tropical, a few in temperate regions. Many species.

Calyx present though the limb is sometimes reduced to merely a rim; flowers hermaphrodite (Subf. I. LORANTHEÆ).

Calyx-tube supported by a bract, no bracteoles

- | | | | | |
|--------------------|----|----|----|----------------|
| Anthers basifixed | .. | .. | .. | 1. LORANTHUS. |
| Anthers dorsifixed | .. | .. | .. | 2. LOXANTHERA. |

Calyx-tube supported by a bract and two bracteoles;

- | | | | | |
|-------------------|----|----|----|----------------|
| anthers basifixed | .. | .. | .. | 3. ELYTRANTHE. |
|-------------------|----|----|----|----------------|

- Calyx-tube without bract, bracteoles 0—4; inflorescence capitate, involucrate; anthers basifixed 4. *LEPEOSTEGERES*.
- Calyx obsolete or represented by a rim; flowers unisexual (Subf. II. *VISCEÆ*).
- Anthers 2-celled, opening longitudinally.
- Plants with leaves; flowers monœcious in jointed spikes, at the bases of the joints 5. *GINALLOA*.
- Plants without leaves; flowers diœcious or monœcious surrounding the bases of the internodes 6. *KORTHALSELLA*.
- Anthers opening by many pores; flowers in axillary triads or flattened capitula.
- Plants with leaves or leafless; anthers combined with the perianth-lobes 7. *VISCUM*.
- Plants with leaves; anthers not combined with the perianth-lobes 8. *NOTOTHIXOS*.

I have been unable to examine specimens of *Nallogia Gaudichaudiana*, H. Baill. in Bull. Soc. Linn. Par. II. 985 (1892) said to be a Malacca tree (?) with cylindric branches, alternate membranous leaves and axillary flowers of which only the ♂ are known. The perianth is 5-lobed and the anthers open by lateral clefts. For the generic description see Baill. Hist. des Pl. XI. 478.

1. *LORANTHUS*, Linn. (restricted).

Parasitic shrubs, with many branches. *Leaves* opposite, subopposite or alternate, usually thick and fleshy or coriaceous, entire. *Flowers* hermaphrodite, usually coloured, in racemes spikes or fascicles, in the axils of the leaves or of fallen leaves, rarely terminal; bract usually small, supporting the base of the calyx-tube, no bracteoles. *Calyx*-tube adnate to the ovary; the limb short, truncate or toothed, sometimes almost obsolete. *Corolla* polypetalous or gamopetalous, regular or zygomorphic; lobes 4—6, valvate, free or more or less connate in a tube, erect or reflexed, the tube often split down one side. *Stamens* as many as the corolla-lobes and adnate to them; filaments slender or thickened; anthers basifixed, usually linear, opening by longitudinal cells, sometimes transversely septate. *Disk* none. *Ovary* 1-celled; style filiform, sometimes geniculate; stigma entire, obtuse or capitate. *Fruit* baccate, usually globose ovoid or ellipsoid, crowned by the persistent calyx. *Seed* albuminous, adnate to the pericarp, often surrounded by glutinous pulp; testa none; embryo straight, terete. **DISTRIB.** Most tropical countries of the Old World.

Corolla lobes free (Subgenus I. EULORANTHUS)

Flowers in racemes or spikes.

Petals 5 (Sect. I. LORANTHOBOTRYS).

Racemes involucrate at base (Subsect. 1. CHIRIDIUM).

Leaves sometimes whorled, lanceolate to ovate-oblong, 8—20 cm. long

1. *L. pulcher.*

Raceme-bases sunk in the substance of the branchlet; style filiform (Subsect. 2. COLEOBOTRYS).

Leaves elliptic or lanceolate, acute, 7—13 cm. long; petals rather thin; anthers 13—14 mm. long, septate

2. *L. heteranthus.*

Leaves elliptic or obovate, obtuse, 4—6 cm. long; petals very thick; anthers 8 mm. long. septate

3. *L. crassipetalus.*

Racemes not involucrate or sunk in a protuberance of the branchlet; style articulate (Subsect. 3. LANTHORUS)

4. *L. pentapetalus.*

Petals 4 (Sect. II. PHENICANTHEMUM).

Racemes 5—7 cm. long, rusty-pubescent; style not articulate

5. *L. coccineus.*

Flowers in sessile clusters; petals 4 (Sect. III. BARATRANTHUS).

Heads always axillary (Subsect. I. CYATHISCUS)

6. *L. productus.*

Heads rarely axillary, usually opposite in clusters on the internodes (Subsect. 2. EUBARATRANTHUS)

7. *L. Lobbii.*

Corolla gamopetalous (Subgenus II. DENDROPHOE) ..

Corolla 4-lobed; fruit more or less pearshaped (Sect I. CICHLANTHEUS). [septate.

Fruit more or less stalked, pyriform; anthers not

Fruit gradually contracted into the stalk; flowers usually single or in few-flowered racemes; leaves more or less oblong

8. *L. obtectus.*

Fruit truncate at top, less gradually contracted; flowers in densely fascicled cymes; leaves elliptic, tomentose beneath

9. *L. ferrugineus.*

Fruit abruptly contracted into a slender stalk; flowers in few-flowered cymes; leaves elliptic, glabrous when old beneath

10. *L. malaccensis.*

Fruit not stalked, oblong, rugose; flowers in pairs or threes in umbellate cymes; anthers septate

11. *L. estipitatus.*

Corolla 5-lobed; fruit ovoid (Sect. II. EUDENDROPHOE).

Branchlets, leaves beneath and inflorescence with orange rusty tomentum, leaves ovate lanceolate, acuminate, 8—13 cm long; corolla inflated in the middle, 4 cm. long; racemes 2.5 cm. long

12. *L. Casuarinæ.*

Branchlets and leaves beneath glabrous; inflorescence sometimes puberulous or furfuraceous.

Racemes under 1.5 cm. long, furfuraceous; corolla

- funnel-shaped, under 2 cm. long; leaves very coriaceous 13. *L. crassus*.
 Racemes 2—3 cm. long, grey-pubescent; corolla ventricose at base, 1.5—2 cm. long; leaves thickly coriaceous 14. *L. pentandrus*.
 Racemes 4—7 cm. long, glabrous; corolla gradually enlarging, 4 cm. long; leaves coriaceous .. 15. *L. longiflorus*.
 Racemes 6—10 cm. long, glabrous; corolla inflated above the middle, 6—8 cm. long; leaves very coriaceous, large. 16. *L. grandifrons*.
 Corolla 6-lobed; fruit cylindric.
 Pedicels 1-flowered (Sect. III. KINGELLA).
 Leaves oblong, over 15 cm. long; corolla 10 cm. long; anthers 8—10 mm. long 17. *L. Scortechinii*.
 Pedicels 2-flowered (Sect. IV. ARCULUS).
 Leaves elliptic, under 8 cm. long; corolla 4—5 cm. long; anthers 2 mm. long 18. *L. Duthieanus*.

1. *LOBANTHUS PULCHER*, DC. Prodr. IV. 295 (1830). A large parasitic shrub growing in large masses on the stems of trees and reaching 6—8 ft. or more in height; branchlets robust, terete, with greenish-grey, shining papery bark, uppermost angular; lenticels elongate, leafscars very prominent. *Leaves* opposite or subopposite, sometimes whorled, very coriaceous, glabrous; lanceolate, ovate or elliptic oblong, long-acuminate at apex, acute to rounded at base; upper surface dark green, lower paler, both light olive-brown when dry and minutely impressed punctate; margin recurved; 8—20 cm. long, 2—8 cm. broad; midrib stout; main nerves about 6—10 pairs, nearly horizontal, short and interarching near the margin, rarely visible; petiole stout, variable, 5—20 mm. long. *Racemes* or spikes subterminal or axillary, solitary or fascicled, densely-flowered from base to point, 10—30 cm. long; the bases surrounded by an involucre of linear tawny scales; rhachis stout; pedicels thick, up to 3 mm. long; bract boat-shaped, acute and ciliate at apex. *Calyx* urceolate, 2—3 mm. long; limb annular. *Corolla* in bud 8 mm. long, constricted in the middle; petals 5, red or the tips yellowish, linear oblong, acute at tip, recurved when open from the middle, the upper part above the stamens having, beneath the thin inner epidermis, a layer of long narrow unicellular hairs, otherwise glabrous. *Stamens* inserted on the middle of the petals with a rugosity below them; filaments flat, 1—2 mm. long; anthers 2 mm. long, the inner valves of the cells shorter than the outer which are curved at the top. *Ovary* short; style somewhat stout, 6 mm. long; stigma hardly capitate. *Fruit* subcylindric, truncate at apex, 5—6 mm. long, pericarp greenish-sticky within. *Seed* toothed at

tip, embryo minute. Hook. f. in Fl. Br. Ind. V. 205; King in Journ. As. Soc. Beng. lvi. ii. 90. *L. speciosus*, Wall. Cat. 578. *L. coccineus*, Hook. Bot. Misc. t. 58 (not of p. 278). *Dendrophthoe pulcher*, Miq. Fl. Ind. Bat. I. i. 821. *Chiridium speciosum*, van Tieghem in Bull. Soc. Bot. Fr. XLI. 541.

SIAMESE STATES: Setub, *Ridley* 14923!. KEDAH: Rawei island, *Ridley* 15704!. PENANG: *Porter* (*Wallich* 578)!; *Phillips*!; at 90—300 m. alt., *King's Collector* 2281!, 4868!; *Curtis* 394!; on Penang Hill, *Ridley* 9390!. PERAK: at Sungie Larut, etc., *Wray* 2296!, 3225!; on hills up to 1200 m. alt., *King's Collector* 6257!, 6407!, 10540!. PAHANG: at Tahan river, *Ridley* 2410! (leaves very shining and thinner).

L. puniceus, Wall. Cat. 522; Hook. f. Fl. Br. Ind. V. 223 seems to be this species and was identified with it, in the Calcutta Herbarium, by the late Sir George King.

var. *Parishii*. Leaves linear lanceolate, verticilled at the summit. Racemes subterminal in the axils of the whorl of leaves. *L. Parishii*, Hook. f. in Fl. Br. Ind. V. 205. *L. perakensis*, Engl. in Engl. & Prantl Nachtr. 129. *Chiridium verticillatum*, van Tieghem in Bull. Soc. Bot. Fr. XLI, 541.

PERAK: *Scortechini* 231!; at Larut at about 300 m. alt., *King's Collector* 6278!. SELANGOR: at Bukit Kutu, *Ridley* 7617!.—DISTRIB. Tenasserim (*Parish* 3005!); Siam (*Kerr* 1763!)

2. *LORANTHUS HETERANTHUS*, Wall. Cat. 537 (1828). A stout parasitic shrub reaching 3 m. or more in height, nearly glabrous; branchlets stout, terete, dark brown or nearly black, older shining; leaf and raceme scars very prominent. Leaves coriaceous, alternate or opposite; elliptic or oblong-lanceolate or linear-lanceolate, obtusely acute at apex, attenuate at base; both surfaces glabrous, upper shining and obliquely striolate, lower dull, pale yellowish-brown when dry; margins subsinuous, recurved; 7—13 cm. long, 2—5 cm. broad; midrib rather slender, raised on both surfaces; main nerves about 10 pairs, joined in loops near the margin, obscure as is the reticulation; petiole stout, 2—3 cm. long, easily disarticulated. Racemes solitary or 2—3 together, terminal and axillary, the base more or less immersed in the branchlets, surrounded by a shallow cup, often curved, red, rusty-puberulous when young, up to 17 cm. long, very sparsely flowered; rhachis angular; pedicels stout, at right angles to rhachis, about 1 cm. long; bract lateral, boatshaped, concave, ciliate; flowers in bud curved upwards, very slender, acute, about 3—4 cm. long. Calyx cylindric, 7—8 mm. long, striate, limb slightly spreading, entire.

Petals 5—6, linear, crimson, 2—3 cm. long, about 1 mm. broad, base rather broader, upper part reflexed in flower, epidermis on inner side thin with a layer of long unicellular hairs beneath. *Stamens* inserted near the base of the petals, very slender, apiculate; filaments 3—4 mm. long; anthers 13—14 mm. long; cells 2, marginal, conspicuously transversely septate. *Ovary* cylindric; style filiform, angular, rugose, nearly 2 cm. long; stigma simple. *Fruit* urceolate, glabrous, striate, 9 mm. long, 5 mm. in diam.; seed obovoid; embryo slender. DC. Prodr. V. 306; Hook. f. Fl. Br. Ind. V. 208; King in Journ. As. Soc. Beng. LVI. ii. 91; Brandis Ind. Trees 548; Prain Beng. Plants 911; Koord. Exkurs. Fl. Jav. II. 157. *L. eleutheropetalus*, Kurz in Journ. As. Soc. Beng. XL. ii. 64 and For. Fl. II. 321. *Dendrophthoe macrocalyx*, Miq. Fl. Ind. Bat. I. i, 821. *Coleobotrys heterantha*, van Tiegh. Bull. Soc. Bot. Fr. XVI. 542.

KEDAH: on Kedah Peak, 900 m. alt., *Ridley* 5484!. PERAK: at Haram Purah, *Scortechini* 860!; up to 1000 m. alt., *Wray* 1172!, 3234!; on trees near Larut at 750—1000 m. alt., *King's Collector* 6362!; at Temango on Durians, *Ridley* 14566!. PAHANG: at Kwala Pahang, *Ridley* 1809!.—DISTRIB. India (Chittagong), Burma, Siam (*Schmidt* 695!), Java, Borneo (*Haviland*), Sumatra (*Forbes* 2867!).

3. *LORANTHUS CRASSIPETALUS*, King in Journ. As. Soc. Beng. LVI. ii. 91 (1887). A parasitic shrub; branchlets very stout, striate with lines from below the leaves or leafscars; bark shining, nearly black when dry. *Leaves* coriaceous, alternate; elliptic or obovate, obtuse at apex, attenuate at base; glabrous, striolate, upper surface shining, lower dull; margins recurved; 4—10 cm. long, 2—5 cm. broad; midrib slightly prominent; main nerves invisible when fresh, obscure when dry as is the reticulation; petiole 5—7 mm. long, stout. *Racemes* solitary or in pairs, axillary, stout, rigid, erect, sparsely many-flowered, 5—15 cm. long, the base enclosed in a thick walled hollow in the branchlet, and subtended by an orbicular ciliate involucre scale: rhachis angular, striate, slightly puberulous; pedicels stout, at about 60° with the rhachis, 2—5 mm. long; bract broad, cochleate, continuing the pedicel and half embracing the calyx tube; flowers erect, nearly parallel to the rhachis, the corolla in bud narrowly conical. *Calyx*-tube cylindric, 5—7 mm. long, striate, slightly puberulous; limb spreading, cupshaped, truncate, with a wavy margin, 1—1.5 mm. long. *Petals* 5, linear, very thick, acute at tip, smooth and yellowish externally, ridged and bright red internally, 18—22 mm. long, the inner epidermis layer covering a layer of linear unicellular hairs. *Stamens* very slender, inserted about $\frac{1}{2}$ up

the petal: filaments quadrangular, 2—5 mm. long; anthers 8 mm. long with two very narrow transversely septate cells. *Ovary* cylindric; style filiform, quadrangular, rugose; stigma minute. *Fruit* not known. *Coleobotrys crassisejala*, van. Tiegh. in Bull. Soc. Bot. Fr. XLI 542?

PERAK: on Gunong Idjou, *Scortechini* 363!, 521; camp on Ulu Batang Padang, 1500 m. alt., *Wray* 1507!; Larut Hills, *Rildley*!

Ridley's specimen in Herb. Singap. has the same flowers, but the leaves are larger and the racemes longer than in the other ones.

4. *LORANTHUS PENTAPETALUS*, Roxb. Fl. Ind. ed. Carey and Wall. II. 211 (1824). A large much branching parasitic shrub reaching 90—120 cm. in height; branchlets stout, terete, with dark blackish grey bark, glabrous, the youngest alternately compressed. *Leaves* coriaceous, opposite or sometimes alternate; ovate or ovate-lanceolate, sometimes elliptic or suborbicular, acute or acuminate, often obliquely, at apex, rounded or attenuate at base; both surfaces dark green and glabrous when fresh, the uppermost with purplish margins, nearly black when dry; 6—12 cm. long, 2—7 cm. broad; midrib stout, prominent beneath; main nerves about 6—8 pairs, very faint; reticulation irregular, obscure; petiole 1—2 cm. long, rather slender, furrowed. *Racemes* solitary or in pairs or threes from the axils of the leaves or of fallen leaves, 10—20 cm. long, all parts bright red in colour except the yellow tips of the petals, flower bearing almost to the base which is sunk in a circular protuberance of the branchlets; rhachis glabrous or slightly puberulous, slightly angular; pedicels very short, thick, at right angles to the rhachis, the flowers ascending so as, at first at any rate, to be parallel to the rhachis; bract ovate, acute, ciliate, appressed to the calyx tube; flowers in bud constricted in the middle, the basal part nearly globose. *Calyx* cylindric, 2—3 mm. long, the limb obscurely toothed. *Petals* 5, the basal portion obovate, thick, glabrous and convex within, the neck transversely rugose, the upper portion ligulate, acute, reflexed in flower, the whole 6 mm. long. *Stamens* inserted above the neck of the petals; filaments broad, 1—2 mm. long; anthers elliptic, 1 mm. long, the inner valve of each cell shorter than the outer. *Ovary* shortly cylindric; style slender, 5 mm. long, jointed in the middle, rugose, the lower half 4—5-angled, the upper slender; stigma small, subtruncate. *Fruit* crimson, ellipsoid, truncate at apex, 7 mm. long, 5 mm. in diam., seed obovoid. Roxb. Fl. Ind. I, 553; DC. Prodr. IV. 295; Wall. Pl. As. Rar. III. t. 225 and Cat. 503; Griff. Notul. IV. 617 and Ic. Pl. Asiat. tt. 624, 625; Blume Fl. Jav. Loranth. 39, tt. 14,

23 A; Kurz For. Fl. II. 322; Korth. Verh. Lor. 66; Hook. f. Fl. Br. Ind. V. 206; King in Journ. As. Soc. Beng. LVI. ii. 90; Engl. in Engl. & Prantl Naturl. Pflanzenfam. III. i. 185; Prain Beng. Plants 911; Brandis Ind. Trees 548; Koord. Exkurs. Fl. Jav. II. 158. *L. polycarpus*, Wall. Cat. 540. *L. erythrostachys*, Wall. MS. *Phaenicanthemum pentapetalum*, Miq. Fl. Ind. Bat. I. i. 823. *Dendrophthoe pentapetala*, G. Don Gen. Syst. III. 419. *Lanthorus pentapetalus*, van Tiegh. in Bull. Soc. Bot. Fr. XLI. 488.

PENANG: Government Hill, *Maingay* K.D. 691!, 692!; *Curtis* 205!; on trees at 300—750 m. alt., *King's Collector* 1522!; *Hullett* 167!; *Ridley* 9364!, 10780!. PERAK: on tree branches about Larut and Goping up to 900 m. alt., *King's Collector* 4227!, 4377!; on Gunong Batu Putih, 1000—1300 m. alt., *Wray* 406!, 466!, at the Cottage, Larut, 1300 m., *Wray* 4240!; *Scortechini* 390!; *Ridley* 2968!. SELANGOR: at Ginting Bidai, 600 m. alt., *Ridley* 7619!. MALACCA: *Griffith* K.D. 2724!, 2725!: at Serkam, *Derry* 1098!; *Hervey*!. PAHANG: at Pekan, *Ridley* 1072!. SINGAPORE: *Lobb* 327!.—DISTRIB. India (E. Himalaya, Assam, E. Bengal), Burma, Java, Sumatra, Borneo (at Kuching *Ridley* 11666!; *Haviland*), Siam (*Murton* 65!, *Kerr* 619!).

5. *LORANTHUS COCCINEUS*, Jack in Mal. Misc. I. 8 (1820). A parasitic shrub, reaching 90—120 cm. in height; branchlets stout, terete, light to dark brown, uppermost rusty or scurfy tomentose as are the innovations. Leaves coriaceous, alternate or subopposite; ovate or ovate-lanceolate, obtusely acute at apex, rounded or cordate at base; both surfaces glabrous or slightly puberulous, dark olive-green when dry; 6—12 cm. long, 3—7 cm. broad; midrib stout, prominent beneath; main nerves 5—7 pairs, curving and meeting in loops towards the margin; reticulation irregular; petiole 10—15 mm. long, moderately stout. Racemes axillary, solitary or in pairs, stellately rusty-pubescent, 5—7 cm. long, erect or somewhat spreading, flower-bearing throughout; rhachis striate; pedicels very short, thick, nearly at right angles to the rhachis, the flowers sideways inserted so as, at first at any rate, to be closely parallel to the rhachis; bract cucullate, ovate, closely appressed to the calyx-tube; flowers in bud slightly constricted in the middle, 5—7 mm. long. Calyx cylindric, slightly constricted below the annular obscurely 4-lobed limb, 1—2 mm. long. Petals 4, crimson, the basal portion ovate, glabrous within, the neck and ligulate upper portion with frilled margins, the whole 5—7 mm. long, the upper parts reflexed in flower. Stamens inserted at the

neck of the petals; filaments flat, 2 mm. long; anthers oblong, obtuse, the cells very narrow, marginal, separated by a broad connective. *Ovary* ovoid, 4-angled, the neck narrowed; style slender, 4-sided, not jointed; stigma large, reniform, capitate. *Fruit* reddish-brown, obtusely 4-angled, flask-shaped, truncate at tip, 8 mm. long; seed 4-angled. Hook. Bot. Misc. I. 278 (*excl.* t. 58); Roxb. Fl. Ind. Ed. Carey and Wall. II. 215; DC. Prod. IV. 296; Griff. Notul. IV. 620 and Ic. Pl. Asiat. t. 626; Kurz For. Fl. II. 322; Korth. Verh. Lor. 68; Hook. f. Fl. Br. Ind. V. 206; King in Journ. As. Soc. Beng. LVI. ii. 91; Brandis Ind. Trees 549. *L. racemiferus*, Wall. Cat. 539; DC. l.c. *Phoenicanthemum coccineum*, Miq. Fl. Ind. Bat. I. 825; van Tiegh. in Bull. Soc. Bot. Fr. XLI. 544. *P. Bennettianum*, Miq. l.c. 826. *Dendrophthoe coccineus*, G. Don Gen. Syst. III. 419. *D. ? racemiferus*, G. Don. l.c.

PENANG: on trees at 250—300 m. alt., *King's Collector* 4914!; Government Hill, *Curtis* 243!. PERAK: at Waterfall Hill, etc., 250 m. alt. *Wray* 2582!, 3270!; *Scortechini* 261!; on trees near Larut and Goping, *King's Collector* 1017!, 2323!, 8124!, 10524!. PAHANG: at Kwala Pahang, *Ridley* 1427!. SELANGOR: at Labu river, *Ridley* 7616!. MALACCA: *Griffith* K.D. 2718!; *Maingay* K.D. 690!; at Bukit Senggeh, *Goodenough* 1453!. JOHORE: at Bukit Kayara, *Ridley* 11340!. SINGAPORE: at Bukit Mandai, *Ridley's Collector* 6697!.—DISTRIB. India (Cachar), Burma, Andamans, Borneo (at Kuching *Haviland* 472!), Bangka.

6. *LOBANTHUS PRODUCTUS*, King in Journ. As. Soc. Beng. LVI. ii. 91 (1887). A parasitic glabrous shrub with long branches; branchlets strongly 4-angled, slightly flattened especially at the nodes, dark brown to nearly black when dry. *Leaves* coriaceous, opposite; lanceolate or ovate, obtusely acute at apex, cuneately attenuate, often unequally, at base; blue-green when fresh, black-brown when dry and much wrinkled on both surfaces; margins subsinuate, recurved; 6—12 cm. long, 3—6 cm. broad; midrib stout, prominent on both surfaces; main nerves 3—8, very irregular, curving to and along the margin and joined in loops; reticulation obscure; petiole stout, 7—15 mm. long, bordered by the decurrent margins of the blade. *Flowers* crowded in axillary clusters, sessile; bract a short cylindric obscurely 2—4-crenate tube 4 mm. long, enveloping the calyx-tube; flowers in bud clavate about 1 cm. long. *Calyx*-tube very short; limb cylindric, truncate, dentate, ciliate on the margins, 4—5 mm. long. *Petals* 4, free, linear-oblong, acute, thick, 10—13

mm. long, reflexed in flower from about the middle, margins of slightly enlarged base ciliate. *Stamens* inserted a little below the middle of the petal, which is rugose below them; filaments broad, 4 mm. long; anthers about 3—4 mm. long, curved when mature; cells parallel, introrse, transversely septately pitted in a double row of cells, inner valves shorter than outer. *Ovary* ovoid; style linear, angled, rugose, slightly geniculate a little below the middle; stigma small, truncate. *Fruit* globose, 6—8 mm. in diam., smooth, crowned by the persistent rather long cylindric calyx-limb and enveloped at base by the persistent bract which forms a flattened cup; seed obovoid, surrounded except at the base by the sticky gum, embryo linear. *Cyathiscus productus*, van Tiegh. in Bull. Soc. Bot. Fr. XLI. 539.

PERAK: *Scortechini* 391!, 581!; camp on Ulu Badang Padang, 1500 m. alt., *Wray* 1531!, 2949!; near Larut at 1000—1200 m. alt., *King's Collector* 3240!.

7. *LORANTHUS LOBBII*, Hook. f. in Fl. Br. Ind. V. 204 (1886). A parasitic shrub; branchlets terete with pale greyish-brown obscurely puberulous scaly bark, innovations ferruginous-pubescent. *Leaves* opposite, thickly coriaceous, glabrous; ovate-lanceolate, acuminate at apex, rounded or acute at base; when fresh dark green above, brownish-green beneath, both surfaces nearly black when dry and minutely impressed-punctate through contraction of the tissues; 5—15 cm. long, 2—6 cm. broad; midrib thick, main nerves about 4—6 pairs rarely at all visible; petiole none or up to 7 mm. long, thick. *Flowers* pale yellow, minute, sessile, clustered on a thickened cushion-like peduncle, 6—20 in each cluster, the clusters in opposite pairs in the axils of the leaves or in whorls at intervals along the internodes; bract scale-like. *Calyx* tubular, rusty-pubescent, 2 mm. long, the limb very faintly toothed. *Petals* 4, free, linear-oblong, thick, puberulous, 4 mm. long. *Stamens* minute, inserted above the middle of the petals; anthers 1 mm. long, filaments as long. *Ovary* globose; style very short; stigma cylindric, papillose, 3 mm. long, obtuse and obscurely 4-lobed at apex. *Fruit* brown, ellipsoid, 4—5 mm. long, puberulous, tipped with the remains of the calyx-limb. *King* in Journ. As. Soc. Beng. LVI. ii. 90. *Baratranthus Lobbii*, *Kingii*, *Scortechinii*, *bicolor*, van Tiegh. in Bull. Soc. Bot. Fr. XLI. 537.

KEDAH: on Kedah peak, *Ridley* 5486!. PENANG: *Lobb* 338!; *Maingay* K.D. 695/2!; at 600—750 m. alt., *King's Collector* 1318!, 1695!; on Government Hill, *Curtis* 85!; 389!; Balik Pulau Road,

Ridley 8020!; on Penang hill, *Ridley* 10183!. PERAK: on trees on the hills about Larut, Goping, etc., up to 1500 m. alt., *King's Collector* 2643!, 4486!, 5011!, 6294!, 8061!, 11024!; *Scortechini*!; at lower camp and to the summit of Gunong Batu Putih, 1000—2000 m. alt., *Wray* 357!, 933!, 1018!, 2521!; at Gunong Hijan, *Ridley* 2969!. SELANGOR: at Samangko Pass, *Ridley*, 2058!. PAHANG: at Tahan river, *Ridley* 2251!; at Gunong Tahan, *Wray & Robinson* 5485!; *Ridley* 16095!. JOHORE: at Kukub, *Ridley* 13261!. SINGAPORE: at Changi and Chanchukang, *Ridley*!.

Van Tieghem in his paper in the Bulletin of the Société Botanique de France, Vol. XLI. 533 entitled 'Quelques compléments à l'étude des Loranthées à calice dialysépale et anthères basifixes' has expressed the opinion that there are four species distinct from each other in the material arranged and distributed by Sir G. King after writing his paper on the species of *Loranthus* indigenous in Perak. They are thus characterized and separated:

- | | |
|--|--|
| Leaves sessile | .. 1. <i>Baratranthus Lobbii</i> . |
| Leaves petiolate, broad, often unequal-sided, their surfaces similar, their lateral nerves visible even on the upper surface | .. 2. <i>Baratranthus Kingii</i>
(<i>King's Collector</i> 2643. 6294). |
| Leaves petiolate, their surfaces similar, their lateral nerves not visible | .. 3. <i>Baratranthus Scortechinii</i>
(<i>Scortechini</i> —no number). |
| Leaves petiolate, their surfaces dissimilar the lower being reddish yellow | .. 4. <i>Baratranthus bicolor</i>
(<i>King's Collector</i> 4486, 11024). |

The question of absence of petiole in *L. Lobbii* is not borne out by the specimens quoted by Hooker in the Fl. Br. Ind., for both Maingay's and Curtis' specimens show short petioles. The other characters quoted do not seem to be constant so I prefer to leave the material as sorted by Sir George King and not to attempt a subdivision which I do not myself believe to be warranted.

8. *LORANTHUS OBTECTUS*, Wall. Cat. 534 (1828). A parasitic shrub with slender pendulous branches; branchlets slender, terete, greyish-brown, shining, with small raised lenticels, uppermost with innovations and inflorescence thickly covered with a tomentum of rusty-red, mossy, jointed hairs. *Leaves* chartaceous, opposite or sub-opposite; ovate-lanceolate or elliptic-oblong, obtusely acute at apex, rounded or cordate at base; both surfaces blackish-brown when dry, upper smooth, glabrous when mature, lower also glabrous except the midrib when old, thickly rusty-tomentose when young; 3—8 cm. long, 1.5—5 cm. broad; midrib slender, main nerves 7—8 pairs, irregular, joined in arches towards the margin; reticulation fairly

prominent in a dry state; petiole rather thick, 4—5 mm. long, tomentose. *Flowers* in axillary fascicles, single or in short few-flowered racemes about as long as the petiole, densely mossy-tomentose; pedicels short; bract ovate, obtuse, 1—2 mm. long, clasping the base of the calyx tube. *Calyx*-tube obovoid, 5—6 mm. long; limb stout, constricted at the mouth. *Corolla*-tube in bud slender, curved, clavate, the tip obtuse, 10—12 mm. long, when open cleft about half-way down on one side; lobes 4, short, obtuse, thick. *Stamens* 4; anthers 1 mm. long, apiculate; filaments as long or slightly longer, flat. *Ovary* obovoid; style slender, 4-angled; stigma scarcely capitate. *Fruit* pyriform, the stalk gradually attenuate downwards, the mouth contracted, about 1 cm. long. DC. Prodr. IV. 299. *L. Scurrula*, L. var. *obtecta*, Kurz For. Fl. II. 319; Hook. f. Fl. Br. Ind. V. 209. *L. Scurrula*, L. var. *laevigata*, Hook. f. l.c. *Dendrophthoe obtectus*, G. Don Gen. Syst. III. 419.

TRANG: on branches of trees on low ground, *King's Collector* (*Kunstler*) 1418!. PERAK: Maxwell's hill, 1500 m. alt., *Fox* 120!. MALACCA: *Griffith* K. D. 2733!, 2735!; at Bukit Senggeh, *Goodenough* 1833!. JOHORE: at Kota Tinggi, etc., *Ridley* 4212!, 11031!.—
DISTRIB. Burma.

The Malay *L. obtectus*, Wall., seems to me to be distinct from the Indian *L. Scurrula* so I have thought it best to retain Wallich's name instead of describing the material under *L. Scurrula* var. *obtecta* as is done in the Fl. Br. Ind. It comes very near *L. Schultesii*, Blume of Java. I have carefully examined the original specimens of *L. Scurrula*, Linn. Sp. Pl. Ed. II. 472 now in the possession of the Linnean Society, and consider that the Malay specimens now under consideration do not agree with it. The leaves have a different shape, the flowers are rather larger and the fruit is less truncate while all the parts are more conspicuously tomentose.

9. *LORANTHUS FERRUGINEUS*, Roxb. Fl. Ind. ed. Carey & Wall. II. 207 (1824). A parasitic shrub with long pendulous branches; branchlets terete, moderately slender, the bark greyish-brown, minutely lenticellate, uppermost parts, like the under surface of the leaves, the innovations and the inflorescence covered with dense ferruginous mossy tomentum of jointed squarrose hairs. *Leaves* opposite or sub-opposite, coriaceous; uniform in shape, elliptic, very obtusely acute at apex, rounded at base; upper surface dark brown or black when dry; 4—10 cm. long, 2—6 cm. broad; midrib slender, often zigzag; main nerves 5—8 pairs, irregular, branching and joined in loops towards the margin; reticulation obscure; petiole 7—8 mm. long, rough, channelled above. *Flowers* in axillary fascicles of few-

(2—6-) flowered cymes as long as or slightly longer than the petioles; pedicels slender, short; bract ovate embracing the base of the turbinate calyx-tube. *Calyx*-tube 4—5 mm. long, limb short, ciliate. *Corolla* variable in length, 10—20 mm. long, in bud clavate, when open cleft on one side half way down, green or grey inside; lobes 4, obtuse, glabrous within. *Stamens* 4, anthers oblong, 1—1.5 mm. long; filaments broad, 1.5—2.5 mm. long. *Ovary* cylindric; style slender, 4-angled, slightly bent near the top; stigma subrotund. *Fruit* ovoid-pyriform, densely mossy-tomentose, truncate at top. Roxb. Fl. Ind. I. 551 and II. 188 (*ferruginosus*); DC. Prodr. IV. 299; Wall. Cat. 500; Jack in Mal. Misc. I. 9 and in Hook. Bot. Misc. I. 279, t. 59; Hook. f. Fl. Br. Ind. V. 210; King in Journ. As. Soc. Beng. LVI. ii. 92; Koord. Exkurs. Fl. Jav. II. 159. *Dendrophthoe ferruginea*, G. Don Gen. Syst. III. 420; Miq. Fl. Ind. Bat. I. i. 812. *Cichlanthus ferrugineus*, van Tiegh. in Bull. Soc. Bot. Fr. XLII. 253.

PENANG: Wallich 500!; Phillips!; at Waterfall, Curtis 2640!, G. King!; Kurz!; Penang Hill, Ridley 10782, etc.!; John Scott!; Deschamps!. PERAK: at Changkat Serdang, Wray 745!; Scortechini 22!, 630!, 2099!. PAHANG: at Katapong, near Pekan, Ridley 1234!. MALACCA: Griffith K. D. 2727!; Maingay K. D. 686; Cuming 2257!; Hervey!; Hullett 399!; Ridley 10755!. SINGAPORE: King's Collector 1139!; Ridley!; Murton 137!.—DISTRIB. Java, Sumatra.

10. *LORANTHUS MALACCENSIS*, Hook. f. in Fl. Br. Ind. V. 210 (1886). A parasitic shrub reaching 60—90 cm. in height; branchlets brownish-grey, terete, closely lenticellate with small pale rounded lenticels, uppermost slender, scurfily rusty-pubescent. *Leaves* thinly coriaceous, opposite or subopposite; elliptic or ovate-elliptic, obtusely acute at apex as at base; both surfaces dark brown when dry, almost shining above, puberulous when young, glabrous when old except the midrib; 3—6 cm. long, 2—4 cm. broad; midrib slender, rusty-pubescent; main nerves 4—6 pairs, irregular, meeting in arches towards the margin, reticulation otherwise obscure; petiole slender, rusty-puberulous, 6—10 mm. long. *Flowers* in axillary few- (about 5-) flowered rusty-pubescent cymes as long as the petiole; pedicels short, slender; bract ovate, minute, 1 cm. or more below the base of the *calyx*-tube which is pyriform and 2—3 mm. long, the limb truncate, contracted. *Corolla* brown in bud, slender, clavate, 10—11 mm. long, when open one side split about half way down; lobes 4, acute, short. *Stamens* 4, anthers oblong, .5—1 mm. long, shortly apiculate; filaments rather longer. *Ovary* ovoid; style slender, 4-

sided, stigma subcapitate. *Fruit* reddish-brown, obconic, rather abruptly contracted into a slender stalk, scurfily rusty-pubescent, about 8 mm. long in all. King in Journ. As. Soc. Beng. LVI. ii. 93.

PENANG: on tree-branches at 600—750 m. alt., *King's Collector* (*Kunstler*) 1308!. PERAK: on high trees at 900—1200 m. alt., *King's Collector* 6286!; *Scortechini* 311!; 647! SELANGOR: at Ginting Bidai, *Ridley*! PAHANG: at Katapong, *Ridley* 1232!. MALACCA: *Griffith* 2711!

11. *LORANTHUS ESTIPITATUS*, Stapf in Trans. Linn. Soc. Ser. 2 IV. 221 (1894). A parasitic shrub; branchlets slender, brown, rough with many small circular whitish lenticels, uppermost and innovations rusty and scurfily pubescent. *Leaves* thinly subcoriaceous, subopposite; elliptic or suborbicular, obtuse or emarginate at apex, shortly cuneate at base; upper surface glabrous, lower glabrous when old, when young densely rufous-tomentose; 3.5—5.5 cm. long, 2.5—5 cm. broad; midrib slender, main nerves 3—4 pairs, irregular, meeting in arches near the margin; reticulation obscure; petiole slender, 8—10 mm. long. *Flowers* in an umbellate cyme in pairs or threes on a common slender peduncle 8—10 mm. long, single or fascicled in the axils of the leaves, rufous-tomentose as the whole inflorescence; pedicels slender, 7 mm. long; bract very small, ovate, embracing the calyx-tube. *Calyx* ovoid or nearly globose; limb very short, ciliolate. *Corolla*-tube in bud very slender, curved, clavate, 10—24 mm. long, glabrous within, the tip ovoid, when open cleft into 4 lobes, one of the clefts extending about to the middle of the tube. *Stamens* inserted near the top of the tube; filaments adnate to the tube below, free only for about 1 cm.; anthers oblong, 2—2.5 mm. long, obtuse, cells transversely septate. *Ovary* included in the calyx-tube; style very slender, 4-angled, stigma clavate. *Fruit* oblong, 7 mm. long, 4 mm. in diam., glabrous, prominently rugose, not stalked.

PERAK: *Scortechini* 421!, at Gunong Haram 647!.—DISTRIB. Borneo (*Fraser* 183!; Kinabalu Mt. *Haviland* 1351!).

Scortechini 421 was identified by Sir George King with *L. Scurrula*, L. var. *obtecta*, but Dr. O. Stapf in his paper on the Flora of Kinabalu in Borneo, rightly pointed out that the fruit is quite different, being oblong and not clavate. He, like Sir G. King, makes *Scortechini* 311 the same, but that specimen seems to me to differ very much and to belong to *L. malaccensis*.

12. *LORANTHUS CASUARINÆ*, *Ridley* in Trans. Linn. Soc. 2nd Ser. III. 342 (1893). A parasitic shrub; branchlets stout, smooth, with

dark brown lenticellate bark, the younger ones and other parts covered with a rusty orange-coloured (when fresh) tomentum. *Leaves* fleshy, opposite; ovate-lanceolate, acuminate at apex, rounded or subcordate at base; upper surface glabrous, lower covered with a rusty tomentum; 8—13 cm. long, 4—5 cm. broad; midrib stout, raised on both surfaces; main nerves about 5—6 pairs, very obscure as is the reticulation; petiole 5—6 mm. long. *Flowers* in axillary racemes about 2.5 cm. long, covered with a ferruginous tomentum of branched multicellular hairs; bract lanceolate, acuminate, 12 mm. long. *Calyx*-tube short, cylindric, somewhat compressed in the middle, limb scarcely any. *Corolla*-tube curved, narrowed a little above the base then dilated and again slightly narrowed below the mouth, 4 cm. long, cleft on one side to about the middle, glabrous within; lobes 5, linear, curved, 10—12 mm. long. *Stamens* 5; anthers linear, apiculate, 3—4 mm. long; filaments slender, 5 mm. long. *Ovary* ovoid; style slender, longer than the stamens; stigma subclavate. *Fruit* (immature) lageniform, densely rusty tomentose without, 8—10 mm. long.

PAHANG: on *Casuarina equisetifolia*, Forst, at Sungei Meang. Ridley 1526!.

13. LORANTHUS CRASSUS, Hook. f. in Fl. Br. Ind. V. 217 (1886). A parasitic shrub; branchlets stout, the younger ones with smooth grey bark and few lenticels, the older ones rough with many lenticels; nodes swollen. *Leaves* very thickly coriaceous, opposite subopposite or alternate, very variable in shape; elliptic, ovate-oblong or oblong-lanceolate, sometimes nearly orbicular, obtusely acute at apex, rounded or attenuate at base; both surfaces dark brown and opaque when dry; 8—18 cm. long, 4—10 cm. broad; midrib very stout especially at base, raised on both surfaces; main nerves irregular, 5—6 pairs, distinct when dry, curving upwards to disappear near the margin; reticulation not visible; petiole very stout, 5—7 mm. long. *Flowers* in axillary racemes up to 12 mm. long; the racemes about 5—6-flowered, densely furfuraceous; pedicels very short, stout; bracts ovate, acute, 1—2 mm. long. *Calyx*-tube globose or urceolate, the limb truncate, faintly lobed. *Corolla* straight, funnel-shaped, not or only very slightly split on one side, 17—18 mm. long, equally cleft to a little below the middle into 5 linear lobes, reflexed for half their length. *Stamens* 5; anthers linear, 2—3.5 mm. long, as long as the stellately puberulous filaments. *Ovary* ovoid; style slender, nearly as long as the corolla-lobes; stigma large, capitate.

Fruit ovoid-oblong, 8—10 mm. long, puberulous without, crowned by the cupular persistent calyx-limb. Ridley in Journ. Str. Br. R. As. Soc. LIX. 165. *L. retusus*, Wall. Cat. 504, in part only.

KEDAH: Lankawi island *Curtis* 2641! Vern. 'Bendalu apia'; on *Dacrydium*, the leaves red, Gunong Jerai, *Ridley*. SINGAPORE: *Wallich* 504! (in part only); at Changi, *Ridley* 1933!; in gardens *Ridley* 8064!, 8901; at Bukit Mandi, *Ridley*!.

14. *LORANTHUS PENTANDRUS* Linn. Mant. 63 (1767). A parasitic shrub, reaching a considerable size even to 3—4 m. in height, branches stout; branchlets rather stout, terete, grey, shining, uppermost puberulous. *Leaves* thickly coriaceous, subopposite, or alternate; variable in shape, lanceolate- or ovate-elliptic to nearly orbicular, obtuse to acute at apex, broadly attenuate to cuneate at base; both surfaces glabrous, dark brown or almost black when dry; 5—15 cm. long, 3—10 cm. broad; midrib stout, prominent, wavy; main nerves 3—5 pairs, faint; reticulation not visible; petiole stout, 6—10 mm. long, bordered above by the decurrent margins of the blade. *Flowers* in axillary, sometimes fascicled, scurfy, grey-pubescent racemes reaching 2—3 cm. long; rachis slender, stellately pubescent as are the calyx, corolla and filaments; pedicels short, slender; bract ovate, acute, 2 mm. long, embracing half the base of the calyx-tube. *Calyx*-tube ovoid or urceolate, 3 mm. long, densely grey-tomentose; limb shortly 5-toothed. *Corolla* in bud cylindric above, ventricose at base, puberulous, 15—20 mm. long; when open cleft two-thirds of the way down into 5 equal linear acute lobes which are reflexed at their middle; greenish outside, yellow or orange within. *Stamens* 5, erect, nearly as long as the corolla lobes; anthers linear, obtuse at apex, 2 mm. long; filaments flat, 5 mm. long, sparsely stellate-farinose. *Ovary* ovoid; style rather thick, angled; stigma capitate. *Fruit* ovoid, 8—10 mm. long, contracted and crowned at the top by the persistent calyx-limb, at first farinose at length glabrous; cotyledons pointed. DC. Prodr. IV 305; Bl. Bijdr. 661; Kurz For. Fl. II. 320; Blume Fl. Jav. Loranth. 33, t. 10; Korth. Verh. Lor. 80; Hook. f. Fl. Br. Ind. V. 216; King in Journ. As. Soc. Beng., LVI, ii. 93; Prain Beng. Plants 911; Koord. Exkurs. Fl. Jav. II. 159. *L. farinosus*, Desr. in Lamk. Encyc. III. 597; Roxb. Fl. Ind. ed. Carey & Wall. II. 221; Wall. Cat. 514; Griff. Notul. IV. 616 and Ic. Pl. Asiat. t. 620, f. 1, 2; *L. rigidus*, *contractus* and *Finlaysonianus*, Wall. Cat. 531, 6864, 6871. *L. maculatus* and *venosus* Bl. Bijdr. 662. *Dendrophthoe pentandra* and *farinosa*, Miq. Fl. Ind. Bat.

I. i. 818, 819; van Tiegh. in Bull. Soc. Bot. Fr. XLII, 252. *Scurrula pentandra* G. Don Gen. Syst. III, 424. *Elytranthe farinosa*, G. Don Gen. Syst. VI, 427.

SIAMESE STATES: Setul, *Ridley* 14921!; Trang at 30—60 m. alt., *King's Collector* 1411!. PENANG AND SINGAPORE: *Wallich* 514A!. PENANG: on various trees at 150—300 m. alt., *King's Collector* 1299!; on *Eugenia Jambos*, Penang Hill, *G. King*!; at Penara Bukit, *Curtis* 476!; *Phillips*!. PROVINCE WELLESLEY: *King's Collector* 1613!. PERAK: at Gunong Haram, etc., *Scortechini* 22!, 605!; at Waterfall, Gunong Inas, etc., *Wray* 1267!, 1839!, 1903!, 2062!, 4085!; on tree-branches at Larut, etc., *King's Collector* 4931!, 7538!, 7767!; at Pangkor, *Ridley* 8032!. PAHANG: on *Hibiscus tiliaceus*, Sungei Meang, *Ridley* 1534!. MALACCA: *Maingay* K.D. 685!, 687!; *Cuming* 2363! SINGAPORE: *Lobb* 293!; *Hullett* 345!; *King's Collector* 1164!; *Deschamps*!; at Changi, *Ridley* 1930!; on trees in Bot. Garden, *Ridley* 6817!, 8901!.—DISTRIB. India (E. Bengal), Burma, Siam, Sumatra, Java, Borneo.

15. LORANTHUS LONGIFLORUS Desr. in Lamk. Encycl. III 598 (1789). A large parasitic glabrous shrub; branches stout, marked by prominent pale lenticels on a grey smooth bark; branchlets terete, smooth, the nodes swollen. *Leaves* coriaceous, opposite or alternate, very variable in shape; oval, oblong or elliptic, obtuse at apex, attenuate or rounded at base; both surfaces dull, olive brown when dry; 9—15 cm. long, 4—7 cm. broad; midrib very stout at base but quickly narrowing, prominent; main nerves very irregular, about 6—10 pairs, much branched, and joined by irregular transverse nervules; reticulation obscure; petiole stout, 0—1 cm. long. *Racemes* axillary or from the axils of fallen leaves or from 1—2-year old wood, solitary or fascicled, inserted in a shallow cup-like involucre, 4—7 cm. long, many-flowered, usually upcurved with upcurving flowers; pedicels 4 mm. long, slender; bract cupular, acuminate on the upper side and embracing the calyx-tube. *Calyx*-tube short; limb cup-shaped, entire or minutely denticulate. *Corolla* pink or red, often with green lobes; buds 4—4.5 cm. long, curved, gradually enlarging upwards and clavate at tip; when open the tube 3 cm. long, cleft above in 5 lobes which are reflexed for 1—1.5 cm. long, one or two clefts often deeper than the rest. *Stamens* 5; anthers narrow, 12 mm. long, the filaments equal or shorter. *Ovary* sunk in the calyx-tube; style as long as the corolla-lobes; stigma capitate. *Fruit* oblong, smooth or dotted, 1—1.5 cm. long, crowned by the

cupular calyx-limb. DC. Prodr. IV, 304; Roxb. Fl. Ind. Ed. Carey and Wall. II, 217; Wight & Arn. Prodr. iv. 384; Dalz. & Gibs. Bomb. Fl. 110; Brandis For. Fl. 397 and Ind. Trees 549; Kurz For. Fl. II. 321; Wall. Cat. 507; Wight Ic. t. 302; Hook. f. Fl. Br. Ind. V. 214; Trimen Fl. Ceyl. III, 468; Cooke Fl. Bomb. II. 548; Prain Beng. Plants 910. *L. bicolor*, Roxb. Corom. Pl. II. 20 t. 139; Fl. Ind. I. 548, II. 185; Wall. Cat. 499. *L. Wightianus*, Wall. Cat. 6872. *Dendrophthoe longiflorus*, van Tiegh. in Bull. Soc. Bot. Fr. XLII. 252. *Scurrula longiflora*, G. Don Gen. Syst. III, 423. 'Valli-ithi-cauni' Rheede Hort. Mal. X. 5, t. 4.

MALACCA: Griffith 1710!.—DISTRIB. India, Burma, Ceylon.

16. *LORANTHUS GRANDIFRONS*, King in Journ. As. Soc. Beng. LVI. ii, 93 (1887). A parasitic shrub reaching 90—120 cm. in height; branches stout with dark greyish-brown roughly lenticellate bark; branchlets terete, rather slender, little swollen at the nodes; dark-brown. *Leaves* alternate or sub-opposite or rarely opposite, thickly coriaceous; broadly ovate or lanceolate, acute or acuminate at apex, rounded or cordate at base; both surfaces dull, sparsely pulverulent, upper often bullate, dark brown when dry; margin recurved; 12—27 cm. long, 6—16 cm. broad; midrib very stout, slightly raised above, very prominent beneath; main nerves 4—6 pairs, prominent, especially on the lower surface, the lower pairs from near the base, the others distant, all curving upwards and joined in loops towards the margin; secondary nerves and transverse nervules also prominent beneath; petiole very stout, 1.5—3 cm. long. *Flowers* in racemes from the axils of the leaves or of fallen leaves; the racemes 6—10 cm. long, densely covered with grey pulverulent sub-deciduous more or less stellate tomentum, erect or curved, about 30-flowered; pedicels short, about 3 mm. long, thick; bract small, ovate, acute, embracing the base of the calyx-tube. *Calyx*-tube cylindric, inflated at base, 3—5 mm. long; limb 5—6 toothed. *Corolla*-tube cylindric, slender, base whitish, upper parts pink, 6—8 cm. long, curved, 5-ribbed, more or less inflated above the middle; lobes 5, red within, nearly 2 cm. long, the upper 1 cm. reflexed, linear. *Stamens* 5, exsert; anthers linear, flattened, obtuse, 5—6 mm. long; filaments flat, 4 mm. long, stellate-pulverulent. *Ovary* ovoid; style filiform, angular, slightly longer than the stamens; stigma subglobose. *Fruit* ovoid, thickly grey-pulverulent, crowned by the persistent calyx-limb, 8 mm. long, 6 mm. in diam.

SIAMESE STATES: Pongah and Kasum, *Curtis* 3266!. PERAK: at Hulu Kwansa, *Scortechini* 926!; at Kota and Matang Sambu Wray 1958!, 2517!; on the branches of trees near Kinta river and Larut, *King's Collector* 786!, 2067!. NEGREI SEMBILAN: at Seremban, *Ridley* 10023!. PAHANG: at Tulom Alaty, on *Vitex vestita*, etc., *Ridley* 2248!. SELANGOR: at Kwala Lumpur, *Ridley's Collector*!. MALACCA: at Batang Malaka, *Derry* 1156! Vern. 'Mendalu hesar.'—DISTRIB. Sumatra (*Forbes* 1665!, on trees by the edge of heavy forest in Lampongs).

17. *LORANTHUS SCORTECHINII*, King in Journ. As. Soc. Beng. LVI. ii. 94 (1887). A parasitic shrub reaching 60—90 cm. in height; branches stout with smooth shining reddish-brown bark; branchlets thick, terete, smooth, the uppermost pale and angular. *Leaves* coriaceous, in verticils of about 6; elliptic-oblong or oblong-lanceolate, abruptly caudate-acuminate at apex, attenuate at base; both surfaces dark green when fresh, dark olive brown and dull when dry and then minutely wrinkled; margin recurved; 18—25 cm. long, 6—10 cm. broad; midrib very stout, very prominent on both surfaces and minutely wrinkled; main nerves about 15 pairs, invisible in fresh, obscure in dry, specimens, sub-horizontal; petiole very stout, 2—6 cm. long, narrowly winged by the decurrent margins of the blade. *Flowers* numerous, crowded, in short racemes scarcely 4—6 cm. long, at most, from the old wood; rhachis very stout, woody, pitted; pedicels very short, stout; bract ovate, acute, 2 mm. long, embracing the base of the calyx-tube. *Calyx*-tube cylindric, 5 mm. long, limb irregularly dentate. *Corolla* pale yellow, the lobes tinged with green; tube glabrous, cylindric at base, gradually expanded in a slender curved funnel, 10 cm. long; lobes 6, linear, 3 cm. long, the upper 2 cm. recurved in flower. *Stamens* 6; anthers linear, acute, 8—10 mm. long; filaments slender, as long as anthers. *Ovary* cylindric; style filiform, as long as the stamens; stigma red, globose. *Fruit* not seen. *Kingella Scortechinii*, van Tiegh. in Bull. Soc. Bot. Fr. XLII. 250.

PERAK: at Gunong Haram, etc., *Scortechini* 90!, 702!; on branches of large trees near Goping at 90—240 m., *King's Collector* 6020!.

18. *LORANTHUS DUTHIEANUS*, King in Journ. As. Soc. Beng. LVI. ii. 94 (1887). A parasitic shrub; branches stout; branchlets terete, sparsely lenticellate with pale pinkish-brown bark, uppermost

slender, angular when dry, glabrous. *Leaves* coriaceous, alternate, opposite or in verticils of 3 together; elliptic-oblong or elliptic-lanceolate, obtusely acute at apex, attenuate at base; both surfaces glabrous, greyish-green when dry, 5—8 cm. long, 2—3 cm. broad; midrib slender, raised on both surfaces; main nerves invisible in fresh, rather prominent in dry, specimens, 3—5 pairs, irregular, very oblique, curving to anastomose near the margin in an areolate reticulation; petiole 1 cm. long, rather stout. *Flowers* in slender racemes from the axils of the leaves or of fallen leaves, reaching 1—5 cm. in length and about 6-flowered; rhachis, pedicels and bracts minutely puberulous; pedicels 3—4 mm. long; outer bract small, ovate, acute, embracing a pair of flowers each of which is supported by a shallow cup-shaped bracteole. *Calyx*-tube cylindric, 3—4 mm. long; the limb short, truncate, waved at the margin. *Corolla* tubular, glabrous, bright red, curved, inflated upwards and constricted at the neck in bud, 4—5 cm. long; lobes 6, linear, subspathulate, 8—10 mm. long, eventually reflexed. *Stamens* 6; anthers oblong, 2 mm. long, filaments about 4 mm. long, slender. *Ovary* cylindric, surmounted by a thickened cushion from which springs the filiform style, as long as the stamens; stigma globose. *Fruit* not seen. *Arculus Duthieanus*, van Tiegh. in Bull. Soc. Bot. Fr. XLII. 445.

PERAK: *Scortechini*!. SINGAPORE: at Bukit Timah, *Ridley*!.

van Tieghem makes this a separate genus nearer to *Elytranthe* than to *Loranthus*. I do not find the two bracteoles to each flower that he discovered, but there certainly is one. I prefer to retain *Arculus* in *Loranthus*, but it certainly is different from the rest of the genus.

2. LOXANTHERA, Blume.

Parasitic shrubs. *Leaves* coriaceous, entire, exstipulate, opposite or alternate. *Flowers* in short cymes from the axils of the leaves or of fallen leaves; bract ovate, very small, embracing the base of the calyx-tube. *Calyx*-tube cylindric; limb cupular, irregularly cleft. *Corolla*-tube very long, contracted a little above the base and again above the insertion of the filaments; lobes 6, linear-spathulate, reflexed in flower. *Stamens* 6; filaments slender, arched at the top and broadening into the back of the connective rather below its middle; anthers linear, cells 2, parallel. *Ovary* cylindric; style filiform; stigma clavate. *Fruit* of *Loranthus*, etc.—DISTRIB. Two species, in the Malay Peninsula and Archipelago.

1. *LOXANTHERA SPECIOSA*, Blume & Fisch. Fl. Jav. Lor. 11. tt. 20 and 23 C (1828?). A parasitic shrub; branchlets terete, smooth, moderately stout, uppermost sub-compressed. *Leaves* opposite or sub-opposite, coriaceous; ovate or elliptic-ovate, acute or obtuse, sometimes retuse, at apex, attenuate, more or less unequally, at base; both surfaces smooth, glabrous, olive-brown when dry; 8—12 cm. long, 4—6 cm. broad; midrib fairly prominent, dark; main nerves 6—8 pairs, very obscure as is the reticulation; petiole stout, 1—1.5 cm. long. *Flowers* in axillary or sub-terminal, few-flowered, puberulous cymes 2—3 cm. long, the joints very fragile; pedicels stout, 5—8 mm. long; bract very small, ovate, embracing half the base of the calyx-tube. *Calyx*-tube cylindric, 4 mm. long, limb expanded in a cupula 2 mm. long, dentate on the margin. *Corolla*-tube red without, yellow within, curved, in bud 10—12 cm. long, narrowly funnel-shaped to the insertion of the stamens and then constricted, clavate at apex, when open divided into 6 lobes narrowed at the base, spatulate above and circinally twisted, about 4 cm. long. *Stamens* 6; filaments 3 cm. long, curved and thickened at apex in a right angle; anthers attached a little below the middle, hooked at top and bottom, 7 mm. long. *Ovary* cylindric; style filiform; stigma red, clavate. *Fruit* not seen. G. Don Gen. Syst. III. 430; Miq. Fl. Ind. Bat. I. i. 822; van Tiegh. Bull. Soc. Bot. Fr. XLII. 448; Koord. Exkurs. Fl. Jav. II. 166. *Loranthus Loxantherus*, DC. Prodr. IV. 316. *L. coccineus*, Reinw. MS. (not of Jack); Bl. Bijdr. 664. *L. Reinwardtianus*, Schult. Syst. VII. 105; DC. Prodr. iv. 306. *L. speciosus*, King in Journ. As. Soc. Beng. LVI. ii. 95. non Bl.

PERAK: *Scortechini* 1328!; on a tree on the banks of the Kinta river, *King's Collector* 767!. MALACCA: *Griffith* K.D. 2716!. JOHORE: Muar river bank, *Curtis* 3661!.—DISTRIB. Java, Sumatra (*Forbes* 3234!), Borneo (near Kuching, *Haviland*!)

3. *ELYTRANTHE*, Blume (amplified).

Parasitic shrubs. *Leaves* opposite or subopposite, more or less coriaceous, entire, exstipulate. *Flowers* few, in spikes, racemes or pairs with one bract and two bracteoles which may be free or combined in a cup. *Calyx*-tube cylindric, the limb small, truncate. *Corolla*-tube usually entire, more or less cylindric or funnel-shaped, lobes 5 or 6, usually 6, equal, reflexed in flower. *Stamens* 5—6, anthers basifixed. *Ovary* enclosed in the calyx-tube, style slender, stigma

usually capitate. *Fruit* as in *Loranthus*.—DISTRIB. India, Malaya, Polynesia and New Zealand.

Flowers in spikes; bract and 2 free bracteoles large, longer than the calyx-tube (Sect. I. *EUELYTRANTHE*).

All parts glabrous; leaves ovate or oblong, obtuse; bract and bracteoles obtuse, 6—7 mm. long; corolla-tube white

1. *E. albida*.

Most parts scurfily rusty-puberulous; leaves elliptic or obovate, obtuse; bract obtuse, 10—12 mm. long, bracteoles acute, 9—10 mm. long

2. *E. Maingayi*.

Flowers in racemes; bract and bracteoles shorter than the calyx-tube, the latter free or combined in a cup (Sect II. *MACROSOLEN*).

Corolla-tube more than 4 cm. long

Leaves more or less ovate, acuminate at apex—

Leaves under 16 cm. long, 6 cm. broad; corolla-tube 4—6 cm. long, crimson, the lobes green with purple tips

3. *E. formosa*.

Leaves over 15 cm. long, 6 cm. broad; corolla-tube 5—6 cm. long, bright yellow, the lobes green outside, red within

4. *E. Kunsileri*.

Leaves more or less orbicular, cordate at base; corolla-tube 8—9 cm. long, red

5. *E. platyphylla*.

Corolla-tube 2—3 cm. long, red; leaves lanceolate, 7—10 cm. long, under 5 cm. broad

6. *E. avenis*.

Corolla-tube under 2 cm. long

Calyx-tube and corolla-lobes prominently papillose without; racemes of 2 flowers; leaves oblanceolate

7. *E. papillosa*.

Calyx-tube and corolla-lobes not papillose; racemes rather slender with more than 2 flowers, the flowers clavate in bud, more or less funnel-shaped in flower.

Leaves obovate, usually retuse at apex

8. *E. retusa*.

Leaves ovate or lanceolate, usually acute at apex.

Pedicels, bract and bracteoles puberulous; ovary cylindric

9. *E. Lowii*.

Pedicels, bract and bracteoles glabrous; ovary globose

10. *E. globosa*.

Corolla-tube under 1 cm. long.

Leaves lanceolate or oblong-lanceolate, over 2.5 cm. broad, obtusely acuminate; racemes clustered, 4—5-flowered, 12—15 mm. long

11. *E. Barnesii*.

Leaves lanceolate, under 2.5 cm. broad, acuminate; racemes in nearly sessile fascicles, 1—3-flowered, scarcely 5 mm. long

12. *E. Robinsonii*.

Flowers in pairs in the excavations of a thick peduncle; bract moderately large, bracteoles combined in a trun-

cate cup cleft opposite the bract, shorter than the calyx-tube (Sect. III. BLUMELLA).

Bract 2 mm. long, bracteole cup 2—3 mm. long; leaves thinly coriaceous, lanceolate, acuminate at apex, rounded or shortly attenuate at base; corolla-tube deep red, lobes green with purple margins .. 13. *E. diantha*.

Bract 3—4 mm. long, bracteole-cup about 3 mm. long; leaves thickly coriaceous, oblong-lanceolate, obtusely acuminate at apex, attenuate at base: corolla-tube red passing into green, lobes yellow bordered with red 14. *E. Wrayi*.

1. *ELYTRANTHE ALBIDA*, Blume Fl. Jav. t. 22 (1828?) a large parasitic glabrous shrub; branches stout with pale grey bark and prominent nodes; branchlets thick, terete. *Leaves* opposite, chartaceous or subcoriaceous; ovate or oblong, obtuse or obtusely acute at apex, broadly cuneate or attenuate, often unequally, at base; both surfaces dull bluish-green when fresh, greyish brown when dry; 6—12 cm. long, 3—7 cm. broad; midrib moderately stout, prominent on the lower surface, less so on the upper; main nerves 10—12 pairs, irregular, spreading, early-branched, joined by the slender secondary nerves and irregularly areolate reticulation, prominent especially on the lower surface; petiole rather slender, 1—2 cm. long. *Flowers* in 2—6-flowered distichous spikes, single or clustered in the axils of the leaves or of fallen leaves; peduncles stout, about 1 cm. long or longer; rhachis stout, decussately excavated to receive the flowers, usually about 1 cm. long or less; bract boat-shaped, concave, keeled, obtuse, 6—7 mm. long; bracteoles 2, thinner, as long as the bract and produced beyond it. *Calyx*-tube cupular, short, truncate. *Corolla* tube white, constricted above the ovary, then enlarged, curved, 2—3 cm. long; lobes 5—6, slender, bluish without, pale pink within, recurved in flower, 1 cm. long, thickened in a band in the middle within, the tip acute. *Stamens* 5—6; anthers 1—2 mm. long, oblong, apiculate; filaments broad, crimson, 5 mm. long. *Ovary* ovoid, style rather thick; stigma small, capitate. *Fruit* not known. G. Don Gen. Hist. III. 428; Miq. Fl. Ind. Bat. I. i. 832; Engl. & Prantl Naturl. Pflanzenfam. III. i. 189; van Tiegh. Bull. Soc. Bot. Fr. XLII. 439; Koord. Exkurs. Fl. Jav. II. 163. *Loranthus albidus*, Blume Bijdr. 665; DC. Prodr. IV. 299; Korth. Verhand. Loranth. 87; Hook f. Fl. Br. Ind. V. 222; King in Journ. As. Soc. Beng. LVI. ii. 98; Brandis Ind. Trees 551. *L. leucosiphon*, Griff. Notul. IV. 623 and Ic. Pl. Asiat. tt. 619, 621—623.

SIAMESE STATES: Trang, *King's Collector* 1422!. PENANG:

Government Hill, *Curtis* 1113!. PERAK: at Gunong Haram, *Scortechini* 428!, 626!; at lower camp, Gunong Batu Pateh, about 1000 m. alt., *Wray* 450!. MALACCA: *Griffith* K.D. 2708!; *Maingay* K.D. 693. SINGAPORE: at Bukit Timah, *Ridley* 8042!.—DISTRIB. Java, Sumatra, Borneo.

2. *ELYTRANTHE MAINGAYI*, Gamble. A parasitic shrub; branchlets terete, moderately stout, scurfily rusty-puberulous, uppermost somewhat flattened; nodes distant, thickened. *Leaves* opposite, coriaceous; elliptic or obovate, obtuse at apex, acute at base; both surfaces dull, rusty-brown when dry, scurfy; 5—8 cm. long, 2—5 cm. broad; midrib moderately stout, nearly black on the lower surface; main nerves slender, obscure, 3—6 pairs; reticulation not visible; petiole stout, 6—12 mm. long, rusty-puberulous. *Flowers* in sessile, axillary, scurfily rusty-pubescent spikes, single or fascicled, about 1—1.5 cm. long; rhachis very stout, decussately excavated to receive the flowers; bract oblong, obtuse, scurfily pubescent, 10—12 mm. long; bracteoles 2, oblong acute, also scurfily pubescent, 9—10 mm. long. *Calyx*-tube rather slender, limb cupular, 2—2.5 mm. long, glabrous. *Corolla*-tube glabrous, at first broad, then constricted, then funnel-shaped, 4 mm. long; lobes 6, linear, acuminate, spreading or recurved, 10 mm. long, thickened within. *Stamens* 6; anthers acuminate, 1—1.5 mm. long; filaments broad, 2—3 mm. long. *Ovary* ovoid; style rather stout; stigma capitate. *Fruit* not known. *Loranthus Maingayi*, Hook f. Fl. Br. Ind. V. 222.

MALACCA; *Maingay* K.D. 694!. SINGAPORE: at Karanji, *Ridley* 6923!.

3. *ELYTRANTHE FORMOSA*, G. Don Gen. Hist. Dichl. Pl. III. 426 (1834). A parasitic shrub reaching 1.5—2 m. in height, all parts glabrous; branches rounded, pale brown, smooth; branchlets terete, brown, uppermost obscurely angled; nodes swollen. *Leaves* opposite or slightly sub-opposite, coriaceous; ovate or elliptic-ovate or lanceolate, acuminate and often cuspidate at apex, obtuse rounded or rarely attenuate at base; upper surface shining, somewhat bullate, lower smooth; margins recurved; 10—16 cm. long, 4—6 cm. broad; midrib stout, prominent; main nerves 6—8 pairs, irregular, often obscure, if visible impressed above, somewhat prominent beneath, curving upwards to and along the margin: secondary nerves and reticulation obscure; petiole stout, channelled, about 3—5 mm. long. *Flowers* in few- (3-5-) flowered umbellate cymes from the

axils of the leaves or of fallen leaves; peduncle stout, about 3 mm. long; pedicels 3—4 mm. long; bract ovate, concave, 1—5 mm. long; bracteoles 2, smaller, obtuse or slightly acute. *Calyx*-tube cylindric, the limb obscurely toothed, slightly spreading. *Corolla* tube bright crimson, 4—6 cm. long, curved, gradually inflated above and again constricted at the mouth below the lobes; lobes in bud 6, greenish, the tips purple, obovate, afterwards reflexed and twisted, 1—2 cm. long, thickened in a broad ridge inside. *Stamens* 6; filaments broad, 1 cm. long; anthers linear-oblong, 4 mm. long, minutely apiculate. *Ovary* cylindric; style filiform, geniculate near the top; stigma obtuse. *Fruit* not seen. Engl. & Prantl *Naturl. Pflanzenfam. Nachtr.* 126; Koord. *Exkurs. Fl. Jav. II.* 164. *Loranthus formosus*, Bl. *Bijdr.* 664 and *Fl. Jav. Loranth. t.* 15; DC. *Prodr. IV.* 297; Kurz *For. Fl. II.* 317; Hook. f. *Fl. Br. Ind. V.* 220; King in *Journ. As. Soc. Beng. LVI. ii.* 95 *Macrosolen formosus*, Miq. *Fl. Ind. Bat. I. i.* 827; van Tiegh. in *Bull. Soc. Bot. Fr. XLI* 442.

PERAK: *Scortechini* 392!; at Gunong Batu Putih, lower camp and summit, 1800 m. alt., *Wray* 484!, 873!; on trees at 1000—1200 m. alt., *King's Collector* 2170!, 6264!; at Bujong Malacca, 700—800 m. alt., *Curtis* 3322!.—DISTRIB. Burma (*Griffith* K.D. 2729); Java.

The description has been largely taken from that of *Scortechini*.

4. *ELYTRANTHE KUNSTLERI*, Gamble. A large parasitic shrub, usually up to 1 m. in height, sometimes reaching 3 metres, all parts glabrous; branches stout, swollen at the nodes, the bark pale brown; branchlets stout, terete, pale. *Leaves* coriaceous, opposite; ovate to ovate-oblong, acuminate at apex, rounded at base; both surfaces shining, somewhat bullate and olive-brown when dry; margins recurved; 15—25 cm. long, 6—12 cm. broad; midrib very stout, prominent on both surfaces; main nerves 6—10 pairs, prominent, impressed above, raised beneath, irregular, curving to disappear a little short of the margin; secondary nerves also prominent, but much shorter, reticulation obscure; petiole 0 or stout and scarcely 3 mm. long. *Flowers* in few- (about 5-) flowered cymes 1—1.5 cm. long, single or clustered in the axils of the leaves or of fallen leaves; peduncle stout, about 5 mm. long; pedicels 5—7 mm. long; bract ovate, acute, 2—3 mm. long; bracteoles smaller, obtuse, all concave. *Calyx*-tube cylindric, smooth, 6 mm. long, the limb truncate, wavy, slightly spreading. *Corolla* clavate and boldly 6-angled in bud;

tube bright yellow, slightly curved, inflated at the base of the limb, 5—6 cm. long; lobes 6, bright green externally, dark red within, reflexed, sub-spathulate, 1.5—2.5 cm. long, broadened below, with a broad thick ridge internally, the tips acute. *Stamens* 6; filaments stout; anthers linear, 7—8 mm. long, obtuse at apex. *Ovary* cylindric; style slender; stigma truncate. *Fruit* ovoid, 14 mm. long, 8 mm. broad, bright yellow when fresh, black when ripe; seed ovoid, 1 cm. long, sulcate. *Loranthus Kunstleri*, King in Journ. As. Soc. Beng. LVI. ii. 95 (1887). *Macrosolen Kunstleri*, van Tiegh. in Bull. Soc. Bot. Fr. XLII. 442.

PERAK: on trees from sea level up to 250 m. alt. near Larut, Goping and Thaiping, *King's Collector* 2669!, 2760!, 6009!, 8460!. DINDINGS: at Telok Sera, *Ridley* 8030!. PAHANG: Taban river and Kadonding Pulau, *Ridley*!.—DISTRIB. Borneo? (*Haviland*).

5. ELYTRANTHE PLATYPHYLLA, Gamble. A glabrous parasitic shrub; branchlets stout, pale brown, quadrangular. *Leaves* coriaceous, opposite or subopposite; broadly ovate-rotund or suborbicular, obtusely rounded at apex, cordate at base; both surfaces smooth, olive green when dry; margins unequally and remotely crenate or entire; 9—12 cm. long and broad; midrib prominent, thick at base but quickly narrowing; main nerves 4—6 pairs, chiefly from near the base, spreading to anastomose near the margin; reticulation irregularly areolate; petiole very stout, scarcely 2 mm. long. *Flowers* in very short axillary racemes of about 4; bract ovate, acute; bracteoles joined in a hemispheric minutely margined cup. *Calyx*-tube cylindric, truncate, the limb scarcely lobed. *Corolla* large, curved, tubular, red, expanding slightly upwards, 6-angled and inflated below the apex, the tube 8—9 cm. long; lobes 6, green, 2 cm. long, reflexed, linear-lanceolate or subspathulate, blunt and inflexed at the tips, broadly thick-ridged within, spreading at base. *Stamens* 6; anthers linear, with a minute spur at base, 7 mm. long; filaments thick, 10 mm. long. *Ovary* cylindric; style filiform; stigma small, subcapitate. *Fruit* not known. *Loranthus platyphyllus*, King in Journ. As. Soc. Beng. LVI. ii. 97 (1887) *not* of Rich.

PERAK: Scortechini 606?!. SELANGOR: at Ginting Bidai, *Ridley* 7618!. JOHORE: at Sungei Hulu Sembrong, *Lake and Kelsall*!

6. ELYTRANTHE AVENIS, G. Don Gen. Syst. Diehl. Pl. III. 426 (1834). A parasitic shrub reaching 1.5 m. in height, glabrous; branchlets angular, moderately stout, with rough scaly reddish-

brown bark; nodes swollen, uppermost internodes compressed. *Leaves* coriaceous, opposite or subopposite: lanceolate, obtusely acute or acuminate at apex, attenuate at base; both surfaces dull, olive green when dry, margins slightly recurved; 7—10 cm. long, 2.5—5 cm. broad; midrib fairly stout, raised on both surfaces; main nerves obscure, if visible when dry 6—10 pairs; reticulation obscure; petiole none or very short, bordered by the decurrent margins of the blade. *Flowers* in short 3-flowered cymes, single or 2—3 or more together in the axils of the leaves or of fallen leaves; peduncle very short, about 1 mm. long; pedicels slender, 4 mm. long; bract ovate, acute, 2 mm. long; bracteoles shorter, rounded, the bract and bracteoles together embracing the calyx-tube. *Calyx*-tube cylindric, 2 mm. long, the limb irregularly 5—6-lobed. *Corolla* tube slender, curved, red, slightly thickened below the limb, 2—3 cm. long; lobes 6, linear, reflexed in flower, thickened, 1.5—2 cm. long. *Stamens* 6; anthers narrowly linear with a slight spur at the base, 4 mm. long; filaments filiform, 8 mm. long. *Ovary* cylindric; style filiform; stigma globose. *Fruit* (immature) ovoid. *E. evenia*, Engl. in Engl. & Prantl Nachtr. 126; Koord. Exkurs. Fl. Jav. II. 164. *Loranthus avenis*, Bl. Bijdr. 663 (1825); DC. Prodr. IV. 297; Korth. Verh. Lor. 85. *L. evenius*, Bl. Fl. Jav. Loranth. t. 16, (1823?); King in Journ. As. Soc. Beng. LVI. ii. 97. *Macrosolen evenius*, Miq. Fl. Ind. Bat. I. i, 827. *Miquelina evenia*, van Tiegh. Bull. Soc. Bot. Fr. XLII. 443.

KEDAH: on Kedah Peak, *Ridley* 5485!. PERAK: *Scortechini*!; on Gunong Hijan, Gunong Bubu and Ulu Batang Padang, at about 1500 m. alt., *Wray* 645!, 1508!, 3884!. PAHANG: at Kluang Terbang, *Barnes* 10906?!.—DISTRIB. Java, Sumatra (Mt. Dempo, *Forbes* 2401!)

Wray, on No. 3884, says the flowers are 'very pale green', but *Miquel* describes them as red as does *Koorders*, while the plate in *Blume's Flora Javæ* shows them as pale dull red. In every other respect *Wray's* specimens agree perfectly. I am rather doubtful about *Barnes* 10906 which has thinner and more acute leaves.

Loranthus hypoglaucus, *Kurz* in Journ. As. Soc. Beng. II. 309 (1872) and For. Fl. II. 318; Hook f. Fl. Pr. Ind. V. 50 may possibly be only a variety of this with leaves glaucous beneath and corolla tube a little more uniform in thickness (*Pegu*: Nattoung ridge, 6000 ft. *Kurz* 382!)

7. *ELYTRANTHE PAPILLOSA*, *Gamble* in Kew Bull. 45 (1913). A parasitic shrub; branchlets rather slender, round, rough, pale brown. *Leaves* opposite, coriaceous; oblanceolate, rounded at apex, cuneate at base; both surfaces dull when dry and olive brown; 3—4 cm.

long, about 1—5 cm. broad; midrib slender, obscure; main nerves 1—2 pairs, from close to the base only and very oblique, scarcely visible on the lower surface; reticulation not apparent; petiole none or at least under 3 mm. long. *Flowers* yellow-orange, in very short pedunculate pairs, 1—2 together in the axils of the leaves or of fallen leaves; peduncle about 1 mm. long as are the pedicels; bract small, ovate, acute; bracteoles minute, in a 2-lobed lip. *Calyx*-tube ovoid, 2 mm long, prominently papillose, the limb a mere rim. *Corolla*-tube glabrous, cylindric in bud and 6-angled, funnel-shaped in flower, 7—8 mm. long; lobes 6, prominently papillose without, spatulate and recurved in flower, 5—6 mm. long. *Stamens* 6; anthers oblong, 1—5 mm. long; filaments slender, 5 mm. long. *Ovary* ovoid; style slender; stigma capitate. *Fruit* not known.

SINGAPORE: at Kranji, *Ridley* 2045!

8. *ELYTRANTHE RETUSA*, G. Don Gen. Syst. Dichl. Pl. III. 425 (1834). A parasitic glabrous shrub; branchlets stout, rough, lenticellate, greyish-brown; nodes swollen. *Leaves* opposite or sub-opposite, thickly coriaceous; obovate, elliptic or orbicular, sometimes obcordate, obtuse or retuse at apex, cuneate or attenuate at base; upper surface somewhat shining, olive-brown when dry, lower dull; margins recurved; 5—12 cm. long, 2.5—5 cm. broad; midrib rather stout, raised on both surfaces; main nerves 3—5 pairs, obscure and sometimes invisible; reticulation obscure; petiole very stout, 5—7 mm. long. *Flowers* in racemes of 5—7 up to about 1—5 cm. long, solitary or in pairs from the axils of the leaves or of fallen leaves; pedicels slender, 2—3 mm. long; bract ovate, acute, very small; bracteoles combined in a 2-toothed cup, minute. *Calyx*-tube cylindric, 2—3 mm. long, the limb a narrow entire rim. *Corolla*-tube pale rose, cylindric below, dilated below the lobes, up to 2 cm. long; lobes 5—6 usually 6, linear, reflexed in flower, 1 cm. long, yellowish-green. *Stamens* 5—6; anthers linear, slender, 3—4 mm. long; filaments broad, 5 mm. long. *Ovary* included in the calyx-tube; style slender; stigma capitate. *Fruit* globose ovoid, 5—7 mm. long. Engl. & Prantl Naturl. Pflanzenfam. III. i. 188; Koord. Exkurs. Fl. Jav. II. 164. *Loranthus retusus*, Jack in Roxb. Fl. Ind. ed. Carey and Wall. II 212; DC. Prodr. IV. 296; Wall. Cat. 504 in part; Hook. f. Fl. Br. Ind. V. 219. *Macrosolen retusus*, Miq. Fl. Ind. Bat. I. i. 828; van Tiegh. in Bull. Bot. Soc. Fr. XLII. 442.

PERAK: at Lumut on *Eugenia*, *Ridley* 9432!. MALACCA: *Griffith* K. D. 2703!; *Maingay* K. D. 688!; *Cuming* 2305!; on *Dacrydium*,

Mount Ophir, *Ridley* 3160!; top of Mount Ophir, *Hullett*!. SINGAPORE: *Wallich* 504!; on *Rhodomyrtus* at Changi, *Ridley* 1808!; *King's Collector* 1170!.—DISTRIB: Java, Borneo.

9. *ELYTRANTHE LOWII*, Gamble. A parasitic shrub; branchlets moderately stout, terete, brown, the nodes slightly swollen. *Leaves* rigid, coriaceous, opposite; ovate or lanceolate, acute or acuminate at apex, attenuately rounded at base; upper surface shining, olive-green when dry, lower dull, subglaucous; margins recurved when dry; 4—6 cm. long, 1.5—2.5 cm. broad; midrib slender, visible only on the undersurface; main nerves about 4—6 pairs, rarely at all visible; reticulation invisible; petiole stout, rugose, 3—4 mm. long. *Flowers* in 2—4-flowered racemes, scarcely 1 cm. long, in axillary clusters of 1—3; pedicels puberulous, about 3 mm. long; bract ovate, acute, 2—3 mm. long; bracteoles united in a 2-toothed cup, 1—2 mm. long, both puberulous without. *Calyx*-tube cylindric, smooth, 4 mm. long; the limb very short, truncate, waved. *Corolla*-tube curved, 6-angled and slightly inflated at the base of the lobes, 1—1.5 cm. long; lobes 6, 1 cm. long, subspathulate, thickened at the apex, reflexed in flower. *Stamens* 6; anthers oblong, 1—5 mm. long; filaments broad, 6 mm. long. *Ovary* cylindric; style filiform, nearly as long as the stamens; stigma capitate. *Fruit* not known. *Loranthus Lowii*, King in Journ. As. Soc. Beng. LVI. ii. 98 (1887).

PERAK: without locality, *Scortechini* 861!.

10. *ELYTRANTHE GLOBOSA*, G. Don Gen. Syst. Dichl. Pl. III. 426 (1834). A parasitic usually glabrous shrub; branchlets terete, pale brown with lenticellate bark, the nodes swollen. *Leaves* coriaceous, opposite or rarely alternate or in whorls of three; elliptic-ovate or lanceolate, sometimes more or less oblong, acuminate at apex, attenuate at base; both surfaces smooth, shining, olive brown when dry; 6—12 cm. long, 2—6 cm. broad; midrib conspicuous, impressed above; main nerves irregular, often obscure, 5—6 pairs; reticulation obscure; petiole 3—8 mm. long. *Flowers* in axillary racemes, single or in pairs or sometimes clustered, up to 2—3 cm. long; pedicels slender, 0—3 mm. long; bract ovate, acute, 2 mm. long, bracteole-cup 1 mm. *Calyx*-tube urceolate, smooth; limb cup-shaped, truncate. *Corolla* in bud linear-clavate, with folds below the lobes, when open campanulate and slightly gibbous, obtuse, 5—6 mm. long; lobes 6 or sometimes 5, linear, reflexed at the middle, glabrous without, colour varying from green to yellow, usually with purplish tips and

stripes. *Stamens* as many as the corolla-lobes; filaments slender, exsert; anthers small, the cells parallel. *Ovary* conform to the calyx-tube; style long, filiform; stigma large, capitate. *Fruit* an ovoid or globose berry, smooth or minutely dotted, reaching 5 mm. in diam., yellowish in colour, the pericarp fleshy. Engl. & Prant. Naturl. Pflanzenfam. III. i. 188; Koord. Exkurs. Fl. Jav. II. 164. *E. ampullacea*, G. Don l.c. 425. *Loranthus globosus*, Roxb. Fl. Ind. I. 550, II. 187 and ed. Carey and Wall. II. 206; DC. Prodr. IV. 297; Wall. Cat. 6870; Kurz For. Fl. II. 315; Hook. f. Fl. Br. Ind. V. 220. *L. subglobosus*, Wall. Cat. 538; DC. l.c. 297; Kurz l.c. 316. *L. oleoides*, DC. l.c. *L. oleifolius*, Wall. Cat. 524. *L. viridiflorus*, Wall. in Roxb. Fl. Ind. ed. Carey and Wall. II. 219; Wall. Cat. 512. *L. sphaerocarpus*, Bl. Bijdr. 661 and Fl. Jav. Loranth. t. 17; DC. l.c. 297; Korth. Verh. Lor. 85. *L. ampullaceus*, Roxb. l.c. 189 and 209; DC. l.c. 296; Kurz l.c. 316; Wall. Cat. 502; King in Journ. As. Soc. Beng. LVI. II. 97. *L. pallens* and *L. carinatus* Wall. Cat. 523, 529; DC. l.c. 296, 297. *L. subumbellatus*, Bl. Bijdr. 661 and Fl. Jav. Loranth. t. 17; DC. l.c. 297. *Macrosolen pallens*, *sphaerocarpus* and *oleoides*, Miq. Fl. Ind. Bat. I. i. 830, 831.

SIAMESE STATES: Trang, *King's Collector* 1398!. KEDAH: Pulau Lankawi, *Curtis* 2421!. PENANG: *Wallich* 523!, 524!; *King's Collector* 1663!. PERAK: at Tapa, *Wray* 1419!; *King's Collector* 7866!, 10697!; *Scortechini* 221!, 859!. MALACCA: *Griffith* K.D. 2704!; *Cuming* 2343!; *Maingay* K.D. 639!. SINGAPORE: *Murton* 13!; *King's Collector* 1142!; *Ridley* 403!, 2022! etc.; *Hullett* 655!.

Var. *puberula*, Gamble. Inflorescence covered with grey puberulous down; fruits rugose.

PERAK: at Kuala Kangsa, *Wray* 3355!; at Ulu Bubong, *King's Collector* 10083!; *Scortechini* 258!. TRINGGANU: at Pulau Kaltan, *Ridley*!. SINGAPORE: *Ridley* 9220!, 14173!.

11. ELYTRANTHE BARNESII, Gamble in Kew Bull. 45 (1913). A parasitic glabrous shrub (?); branchlets stout with brown rough bark, the nodes much swollen. *Leaves* coriaceous, opposite; lanceolate or oblong-lanceolate, obtusely acuminate at apex, rounded, usually unequally, at base; margins recurved; upper surface shining, lower dull, olivaceous when dry; 6—12 cm. long, 2.5—4.5 cm. broad; midrib prominent and raised on both surfaces; main nerves 7—9 pairs, nearly at right angles to the midrib, curved near the margin, reticulation not visible; petiole stout, 5—7 mm. long. *Flowers* in 4—5-flowered glabrous racemes about 12—15 mm. long, clustered

many together on the enlargement of the nodes in the axils of the leaves and at the ends of the branchlets; pedicels slender, 1.5–2 mm. long; bract ovate-acute, the bracteoles similar and nearly free. *Calyx*-tube ovoid, vertically channelled; limb 1 mm. long, truncate. *Corolla* in bud clavate, angled below the lobes, 8 mm. long; when open the 6 lobes linear acute, reflexed from about the middle (?). *Stamens* 6; anthers oblong, 1.25 mm. long; filaments 3.5 mm. long. *Ovary* ovoid; style slender, slightly angled; stigma obtuse or emarginate. *Fruit* not known.

PAHANG: at Kluang Terbang, *W.D. Barnes* 10905!

12. *ELYTRANTHE ROBINSONII*, Gamble in Kew Bull. 45 (1913). A parasitic shrub growing on trees; branches stiff, with greyish-brown thin bark; branchlets slender, wiry, the uppermost somewhat angular when dry; all parts glabrous. *Leaves* coriaceous, opposite or sub-opposite; narrowly lanceolate, acuminate at apex and at base; upper surface red, lower dull green when fresh, upper olivaceous, shining, lower ferruginous-brown and dull when dry; 5–8 cm. long, 1–2.5 cm. broad; midrib slender, prominent on both surfaces; main nerves indistinct, 3–5 pairs, irregular, very oblique and speedily disappearing; reticulation obscure; petiole 3–4 mm. long, bordered by the decurrent margins of the blade. *Flowers* small, bright orange red, in nearly sessile fascicles of 1–3-flowered racemes scarcely 5 mm. long in the axils of the leaves or of the scars of fallen leaves; pedicels very short; bract ovate, acute; bracteoles combined in a bifid lip. *Calyx*-tube ovoid, 2 mm. long, the limb truncate, entire or very slightly lobed. *Corolla* in bud clavate, 5–6 mm. long, angled below the lobes; lobes 6, linear-lanceolate, as long as the tube. *Stamens* 6: anthers very small, 0.5 mm. long, the filaments 1.5 mm. long. *Ovary* ovoid; style slender; stigma small, obtuse. *Fruit* not known. *Loranthus globosus*, Ridley in Journ. Linn. Soc. XXXVIII. 321 not of Roxb.

PAHANG: on Gunong Tahan, 1200–1500 m. alt., *Wray* and *Robinson* 5404!

13. *ELYTRANTHE DIANTHA*, Gamble. A parasitic shrub, reaching 1 m. in height, quite glabrous; branchlets slender, terete, with pale brown bark, the nodes swollen. *Leaves* opposite, thinly coriaceous; lanceolate or rarely ovate-lanceolate, long acuminate at apex, rounded or very shortly attenuate at base; both surfaces olive-green and somewhat shining when dry; margins slightly recurved;

8—15 cm. long, 2—6 cm. broad; midrib slender, raised on both surfaces; main nerves 4—6 pairs, irregular, oblique, slightly raised above; reticulation also slightly raised when dry, areolate; petiole rather slender, 4—6 mm. long. *Flowers* in pairs in the excavations of a very short peduncle, each with an ovate-acute bract 2 mm. long at the base; bracteoles united in a thick cup 2—3 mm. long, cleft at the outer margin opposite the bract and embracing the base of the calyx-tube. *Calyx*-tube smooth, cylindric, the limb short, truncate. *Corolla* deep red, curved, narrowly tubular, inflated and boldly 6-angled just under the limb, clavate in bud, 5 cm. long; lobes 6, twisted, reflexed, oblanceolate, 2 cm. long, thickened within in a flattened ridge, green with purple margins. *Stamens* 6, lemon-yellow: anthers linear, 5—6 mm. long; filaments 7 mm. long, green. *Ovary* cylindric; style filiform; stigma capitate. *Fruit* globular, smooth, 10—12 mm. in diam., crowned by the calyx-limb. *Loranthus dianthus*, King and Scort. M.S.; King in Journ. As. Soc. Beng. LVI. ii. 96 (1887). *Blumella diantha*, van Tiegh. in Bull. Soc. Bot. Fr. XLII. 441.

PERAK: near Larut, *Scortechini* 76!, 604!; at Relan Tujur, *Wray* 1785!, 2210!; on trees in open forest up to 250 m. alt., *King's Collector* 1870!, 6446!.

14. ELYTRANTHE WRAYI, Gamble in Kew Bull. 46 (1913). A parasitic shrub; branchlets stout, terete, with pale brown bark, the nodes swollen. *Leaves* opposite, thickly coriaceous; oblong-lanceolate, obtuse or obtusely acute, sometimes obtusely acuminate at apex, attenuate and often unequal at base; both surfaces green tinged with red when fresh, smooth and olive-green when dry; 10—13 cm. long, 3—7 cm. broad; midrib stout, raised on both surfaces; main nerves 5—6, irregular, oblique, joined by a faint often obscure reticulation; petiole 0—10 mm. long, bordered by the decurrent margins of the blade. *Flowers* in pairs in the excavations of a short thick axillary peduncle, each flower subtended by a broadly ovate horizontal bract 3.5 mm. long; bracteoles united in a thick truncate cup 3 mm. long, cleft at the outer margin opposite the bract and embracing the calyx-tube; peduncle 3 mm. long, thick. *Calyx*-tube smooth, cylindric, 3—4 mm. long, the limb also cylindric, truncate, 4—6 mm. long. *Corolla*-tube red passing into green below the lobes, curved, narrowly tubular, inflected below the lobes and 6-angled, clavate in bud, 4—5 cm. long; lobes 6, yellow bordered with red, narrowly lanceolate, acute at apex, broadened out at base,

thickened in a ridge within, twisted and reflexed in flower, 1.5—2 cm. long. *Stamens* 6; anthers linear, acute at apex, slightly spurred in front at base, 7—8 mm. long; the filaments as long. *Ovary* short, cylindric; style slender, geniculate below the top; stigma obliquely capitate. *Fruit* not known.

PERAK: in Upper Perak at 300 m. alt., Wray 3770!.

4. LEPEOSTEGERES, Blume.

Parasitic shrubs. *Leaves* coriaceous, entire, exstipulate, opposite or sub-opposite. *Inflorescence* consisting of a sessile capitulum surrounded by sheathing imbricate involucreal bracts, gradually lengthening upwards and sometimes with an inner series; flowers in each capitulum few—many, sessile on a flattened receptacle; bract to each flower 0; bracteoles 0—4, often elongate. *Calyx*-tube short, cylindric or angular, the limb entire or shortly lobed. *Corolla*-tube elongate sometimes cleft to the base, slender, the 5—6 lobes reflexed when open. *Stamens* 5—6 inserted at the mouth of the corolla-tube: anthers basifixed, linear or subulate; filaments slender. *Ovary* included in the calyx-tube; style filiform; stigma subclavate. *Fruit* as in *Loranthus*, etc.—DISTRIB. Malay Peninsula and Archipelago.

Bract and bracteoles of the flower absent; inflorescence up to 15 cm. long; corolla-tube very narrow, lacinate .. 1. *L. Beccarii*.

Bract none, bracteoles 4 up to 2 cm. long; inflorescence up to about 6 cm. long; corolla-tube funnel-shaped, split on one side 2. *L. Kingii*.

1. *LEPEOSTEGERES BECCARII*, Gamble. A glabrous parasitic shrub, the branches often very long, otherwise about 60—90 cm. high; branchlets stout, terete, greyish-brown, the younger quadrangular (at least when dry); nodes swollen. *Leaves* thinly coriaceous, opposite or sub-opposite; from ovate-lanceolate or ovate-oblong to suborbicular, very variable even on the same plant, subacute or obtuse at apex, cuneate or rounded at base; both surfaces dull, bluish-green when dry; 6—12 cm. long, 3—7 cm. broad; midrib fairly stout, scarcely visible on the upper surface; main nerves about 6 pairs, oblique, indistinct; secondary nerves occasional, obscure as is the reticulation; petiole moderately stout, 2—3 cm. long. *Inflorescence* lateral, from nodes on the old wood, of 20—30-flowered densely involucreate sessile capitula, subglobose when young, afterwards strobiliform and much elongate (up to 15 cm.); involucreal bracts large, numerous, imbricate, pale red, oblong to semi-

orbicular, obtuse, the inner 5—8 cm. long, the outer gradually shorter; receptacle obconic, flattened, bearing the closely packed sessile flowers; bracts and bracteoles to the flowers none. *Calyx*-tube angular, 4—5 mm. long, truncate, the limb a mere rim. *Corolla*-tube deep claret-colour, very slender, 7—10 cm. long, splitting into 6 very narrow linear yellow segments which are united for about 1 cm. at base and again slightly just below the twisted reflexed linear obtuse lobes, the lobes about 2 cm. long. *Stamens* 6; anthers linear, acuminate, very narrow, 12 mm. long, the cells lateral; filaments slender, 10 mm. long. *Ovary* cylindric, rounded at top; style filiform; stigma small, rounded. *Fruit* subangular, globose, 8 mm. in diam. *Loranthus Beccarii*, King in Journ. As. Soc. Beng., LVI. ii. 98 (1887). *Stegastrum Beccarii*, van. Tiegh. in Bull. Soc. Bot. Fr. XLII. 447. *Elytranthe Beccarii*, Engl. in Engl. & Prantl Nachtr. (1897) 126.

PERAK: at Gunong Ijuk, *Scortechini* 1208!; on the branches of trees at elevations up to 600 m. alt., *King's Collector* 5793!, 7956!; at Bujong Malacca, *Ridley* 9577!.—DISTRIB. Borneo (*Beccarii* 1171; *Haviland* 3842!).

2. *LEPEOSTEGERES KINGII*, Gamble. A parasitic shrub; branchlets stout, terete, with smooth pale brown bark, the younger ones slightly lenticellate; nodes swollen. *Leaves* coriaceous, opposite; ovate-lanceolate, obtusely acuminate at apex, rounded and often unequal at base; both surfaces olive-green when dry, rather dull, smooth; 7—15 cm. long, 4—8 cm. broad; midrib stout, prominent; main nerves apparently 6—7 pairs, usually quite invisible on either surface as is the reticulation; petiole very stout, 1—2 cm. long. *Inflorescence* axillary, from new wood, of 4—6-flowered densely involucrate sessile capitula, up to about 6 cm. long, prominently 4-angled when young and strobiliform, afterwards elongate; involucrel bracts large, red, keeled, the outer series of 6—7 decussate pairs, the uppermost of which are linear-oblong, obtuse, 3—4 cm. long, the lower gradually smaller and more acute, the inner series of a single lanceolate pair 2—2.5 cm. long; receptacle flattened, bearing the sessile flowers each of which has 4 linear-lanceolate acute keeled bracteoles about 2 cm. long. *Calyx*-tube angular, 2—3 mm. long, the limb unequally 6-toothed. *Corolla*-tube narrowly infundibuliform, 3—4 cm. long, curved below the middle, split nearly $\frac{1}{2}$ -way down on one side and cleft at the apex into 5—6 lanceolate acuminate teeth which are at first reflexed and twisted and then upright and 1—1.5 cm. long.

Stamens 5—6; anthers subulate, acuminate, 5 mm. long, with a slight process at their bases; filaments as long as the anthers. *Ovary* cylindric; style filiform, as long as the stamens; stigma small, subcapitate. *Fruit* ovoid, elongate, crowned by the remains of the calyx-tube. *Loranthus Kingii*, Scortechini ex King in Journ. As. Soc. Beng. LVI. ii. 99 (1887).

PERAK: at Gunong Ijuk, *Scortechini* 1251!; camp on Ulu Batang Padang, 1500 m. alt., *Wray* 1526!. PAHANG: at Kwala Tenoh, Sunjie Tahan river, *Ridley's Collector* 2249!. MALACCA: *Maingay* K.D. 695!; at Selandan, *Ridley* 10771!; at Bukit Sedanan, *Goodenough* 1451!.

Goodenough says the flower is striped white and red, *Ridley's Collector* says, 'bright red with yellow-orange stripes,' *Ridley* and *Wray* say, 'red,' but the material seems to me to belong all to the same species though Sir G. King has named some of the sheets *L. Forbesii*. Stapf in Trans. Linn. Soc. Ser. 2. IV. 222 under his *Loranthus sabaensis* a species from over 3000 m. alt. on Mount Kinabalu in Borneo, doubts if *Maingay's* 695 really is *Scortechini's* plant. From the (only meagre) specimens of the type that I have examined I think it must be, but it is quite clear that further investigation on the spot is needful to clear up the point.

5. GINALLOA, Korth.

Parasitic shrubs, growing on trees; branches dichotomous or whorled, jointed at the nodes, bearing, just above each node, a sheath-like thickening ending in a free ring. *Leaves* opposite, coriaceous. *Flowers* monœcious, in triads in terminal and axillary jointed spikes; bracts connate, cup-shaped, at the base of each joint of the spike, broadened in alternate spikes. *Perianth*-tube in ♂ 3-lobed, the lobes triangular-ovate, thick: in ♀ oblong, also 3-lobed, the lobes smaller and thinner. *Stamens* 3, opposite the perianth-lobes; filaments very stout, short; anthers ovoid, 2-celled, the cells opening by introrse longitudinal or curved slits. *Ovary* conform to the perianth-tube which encloses it; style none; stigma capitate; ovules 1—2. *Fruit* a 1-seeded berry; pericarp leathery enclosing a viscous layer surrounding the seed; perianth lobes persistent. *Seed* ovoid; testa thin; albumen fleshy, bearing the embryo at its apex; cotyledons very small; radicle minute, superior.—DISTRIB. Malay Peninsula, Andaman Islands and Ceylon (according to van Tieghem 9 sp.).

1. GINALLOA SIAMICA, Craib in Kew Bull. 455 (1911).

Var. *Scortechinii*, Gamble. *Branchlets* terete, rather stout, the sheath-like thickening about 8 mm. long. *Leaves* very coriaceous,

ovate or ovate-oblong, somewhat falcate, obtusely acute at apex, unequally rounded or attenuate at base; 5—8 cm. long, 2—5 cm. broad; ribs 3, faint, other nerves and reticulation invisible; petiole stout, up to 7 mm. long, gradually broadening to the base of the blade. *Spikes* terminal, 5 cm. long or more; bracts joined in a cup embracing the rhachis. *Flowers*: ♂ not known, ♀ with 3 minute perianth-lobes surmounting the oblong perianth-tube enclosing the fruit.

PERAK: ? *Scortechini*!

Only one sheet of this interesting plant is available and the material is very scanty. The branchlets and leaves resemble those of *G. siamica*, but that species has 5 nerves to the leaves; it is close enough, however, to be considered a 3-nerved variety and when more material is available it may prove to be a distinct species.

6. KORTHALSELLA, van Tiegh.

Leafless parasitic shrubs, the branches jointed, furnished with bracteate scales at the joints, the joints all in the same plane. *Flowers* in the axils of the scales, monceious, surrounded by tufts of hair, ♂ and ♀ with 3 perianth-lobes which are persistent after flowering in ♀. *Anthers* 3, 2-celled, cells opening by longitudinal slits introrsely but the anthers being connected at their margins the pollen issues by a central aperture. *Ovary* obovoid, placenta central, embryo basal, stigma small. *Fruit* an obovoid berry, the seed albuminous.—*DISTRIB.* India and Malaya, species according to van Tieghem, 61 (*Bifaria*); according to Engler much fewer.

1. KORTHALSELLA JAPONICA, Engl. in Engl. & Prantl Naturl. Pflanzenfam. Nachtr. 138 (1897). A small tufted leafless parasitic shrub, yellow or brown when dry, reaching scarcely 15 cm. in height; branches flattened, contracted at the nodes, the internodes variable in length and breadth reaching 2—5 cm. in length and 5 mm. in breadth, obovate in shape and usually strongly keeled, not twisted but all in one plane. *Flowers* very minute, in dense clusters fasciated in cup-shaped bracts at the tips of the internodes and surrounded at base by short erect hairs, ♂ very few; perianth lobes 3, triangular, acute, concave, persistent in ♀. *Berry* ellipsoid or obovoid, 2—5 mm. long, fleshy. *Viscum japonicum*, Thunb. in Trans. Linn. Soc. II. 329 (1794); DC. Prodr. IV. 283; Hook. f. Fl. Br. Ind. V. 226; Trimen Fl. Ceyl. III. 472; Collett Fl. Siml. 440; Brandis Ind. Trees 552. *V. opuntia*, Thunb. Fl. Jap. 64. *V. articulatum*, Miq. Prol. Fl.

Jap. 297; Benth. Fl. Hongk. 141 and Fl. Austral. III. 396; Brandis For. Fl. 393 (not of Burm.). *V. moniliforme*, Wt. & Arn. Prodr. 380; Wight Ic. t. 1018 and Spic. Neelgh. t. 87; Kurz For. Fl. II. 325 (not of Bl.). *V. Wightianum*, Wall. Cat. 6877 (not of Wt. and Arn.).

KEDAH: on Gunong Jerai, *Ridley*!. MALACCA: on Mount Ophir, *Ridley* 3161!—DISTRIB.: India, Ceylon, China, Japan, Australia.

I have been unable to ascertain to which of his many species of *BIFARIA* the Malay Peninsula form of the old *Viscum japonicum* is attributed by van Tieghem. His *B. japonica* is restricted to the Japanese plant first collected by Thunberg in 1794: see Bull. Soc. Bot. Fr. XLIII. 173 (1896).

7. VISCUM, L.

Parasitic shrubs, growing on trees; branches usually dichotomous, sometimes whorled, jointed, the internodes terete angular or flattened. *Leaves* opposite, flat and thick or reduced to small scales, coriaceous. *Flowers* unisexual, small, fasciculate or solitary or usually in triads, in the axils of the leaves or at the nodes of the branches, rarely terminal; bracts small; bracteoles 2, free or connate in a cup. *Perianth*-tube in ♂ solid, in ♀ adnate to the ovary; lobes usually 4, very short, ovate or triangular. *Stamens* as many as the perianth-lobes and adnate to them, dehiscing introrsely by numerous pores. *Ovary* inferior, 1-celled; ovules solitary or paired; stigma sessile or subsessile. *Fruit* a succulent berry with soft viscid mesocarp. *Seed* adnate to the pericarp; albumen copious, solid; embryo terete, enclosed in the albumen, solitary or 2 to each seed. DISTRIB.: Temperate and tropical regions, species about 30.

Leafy shrubs, perianth-lobes deciduous (Sect. I.

PLEIONIXIA, Korth.)

Leaves thin, ovate or lanceolate, often falcate, acuminate at apex; involucrel bracteoles acuminate, lateral flowers of triads ♀, central ♂ .. 1. *V. monoicum*.

Leaves thick, obtuse at apex; involucrel bracteoles obtuse, lateral flowers of triads ♂, central ♀.

Upper internodes cylindric, striate; leaves coriaceous, more or less oblong; berry warted .. 2. *V. orientale*.

Upper internodes alternately flattened; leaves very coriaceous, obovate; berry smooth .. 3. *V. Wrayi*.

Leafless shrubs, perianth-lobes apparently persistent (Sect. II. *ASPIDIXIA*, Korth.)

Articles 4—10 mm. broad; flowers comparatively large, in many fascicles; berry 5 mm. in diam .. 4. *V. dichotomum*.

Articles 2—4 mm. broad; flowers very minute in few fascicles; berry about 3 mm. in diam. .. 5. *V. articulatum*.

Articles 2 mm. broad; flowers very minute, in few fascicles; berry 2.5 mm. in diam.

.. 6. *V. flexuosum*.

1. *VISCUM MONOICUM*, Roxb. Fl. Ind. III. 763 (1832). A parasitic shrub with numerous dichotomous or opposite branches; branchlets terete, slender, slightly thickened at the nodes, furrowed when dry. *Leaves* opposite, thinly coriaceous; ovate or lanceolate, often falcate, more or less acuminate at apex, attenuate at base; both surfaces glabrous, nearly black when dry; 3–5 cm. long, 1–2 cm. broad; 3–5-ribbed, the outer ribs slightly pedate; nerves few, reticulate; petiole none or very short. *Flowers* monœcious, in axillary sessile or very shortly (1 mm.) peduncled clusters of 1–3, supported by two ovate acuminate bracteoles combined in a shallow cup, the outer flowers of triads ♀ the central one ♂ or wanting; perianth 4-lobed, the lobes ovate—acute, those of the ♂ bearing the sessile anthers. *Ovary* oblong; style 0; stigma very short, conical. *Fruit* an oblong, smooth yellowish berry, truncate at apex. DC. Prodr. IV. 278; Brandis For. Fl. 393 and Ind. Trees 552; Wt. & Arn. Prodr. 379 (in note under *V. orientale*); Griff. Notul. IV. 637 and Ic. Pl. Asiat. t. 631; Kurz For. Fl. II. 324; Hook. f. Fl. Br. Ind. V. 224. Cooke Fl. Bomb. II. 552; Trimen Fl. Ceyl. III. 471; Prain Beng. Plants 912. *V. falcatum*, Wall. Cat. 492; DC. lc. *V. confertum*, Roxb. lc. *vide* Wt. & Arn. *V. bengalense*, Roxb. III. in Herb. Kew. t. 1181.

SIAMESE STATES: Kasoim, *Curtis* 3265!.—DISTRIB. India, Burma, Ceylon.

2. *VISCUM ORIENTALE*, Willd. Sp. Pl. IV. 737 (1805). A parasitic shrub with numerous dichotomous or opposite branches; branchlets terete or angular and grooved, glabrous, the ultimate ones often very slender; nodes thickened. *Leaves* opposite, fleshy-coriaceous; obovate or elliptic-oblong or lanceolate or linear-oblong, obtuse at apex, attenuately narrowed at base; both surfaces glabrous, black or brown when dry, 2–7 cm. long, 1–2.5 cm. broad; 3–5-ribbed, the outside ribs slightly pedate, often very short, and often looped above; nerves few, irregular, transverse; reticulation obscure; petiole none or very short. *Flowers* monœcious, in axillary, sessile or peduncled, clusters of 1–3, supported by two ovate bracts which are combined in a boat-shaped involucre; when in threes the central flower usually ♀, the outer ones much smaller and ♂, sometimes all ♂ or reduced to only one ♀; perianth 4-lobed, the lobes triangular, 1–5 mm. long in ♂, 1 mm. in ♀, in ♂ flowers one pair slightly larger than the other. *Anthers* 4, sessile by their connectives, often one pair larger than the other and more obtuse,

pores rather few. *Ovary* ovoid, stipitate, truncate; style short, conical; stigma capitate. *Berry* ovoid or subglobose, purplish red, rather prominently warted, as large as a pea, sessile or more or less stalked, the stalks up to 1—2 mm. long, thick. DC. Prodr. IV. 278; Wt. & Arn. Prodr. 379; Bl. Bijdr. 666 and Fl. Jav. Loranth. tt. 24, 25; Benth. Fl. Austral. III. 396; Wall. Cat. 491; Brandis For. Fl. 393 and Ind. Trees 552; Kurz For. Fl. II. 324; Hook. f. Fl. Br. Ind. V. 224; Cooke Fl. Bomb. II. 552; Trim. Fl. Ceyl. III. 471; Prain Beng. Plants 912; Miq. Fl. Ind. Bat. I. i. 804; Koord. Exkurs. Fl. Jav. II. 166. *V. verticillatum*, Roxb. Fl. Ind. III. 764.

PERAK: at lower camp, Gunong Batu Pateh, Wray 1074!; tea gardens, Ridley!. PAHANG: at Pulau Jellam, Ridley 2250!. MALACCA: at Merliman, Derry (?) 195!. SINGAPORE: Ridley 1827!, 3777!, 6816!, 10369!, 11392!.—DISTRIB. India, Burma, Ceylon, Java, Borneo (*Haviland* 3092!), China, New Guinea, Australia.

Var. *ovalifolium*, Miq. Fl. Ind. Bat. I. i. 805. *Leaves* larger, up to 8 cm. long, 5 cm. broad, often paler when dry, the 3 middle ribs prominent, the two side ones short and faint; flowers solitary in the involucre and more numerous and in closer fascicles in the leaf-axils; stigma shorter and broader. *V. ovalifolium*, Wall. Cat. 489; DC. Prodr. IV. 278; Kurz For. Fl. II. 325; Hook. f. Fl. Br. Ind. V. 225. *V. obtusatum*, Wall. Cat. 494; DC. l.c. 279.

KEDAH: at Pulau Songsong, Curtis 2599! PENANG: Wallich 489!; Penang Hill, Ridley 9373! PERAK: *Scortechini* 732!. MALACCA: Griffith K.D. 2739!, 2740!; Cuming 2341!; at Tanjong Kling, Ridley 3162!.—DISTRIB. Burma, Andamans, Siam (*Kerr* 818!).

3. *VISCUM WRAYI*, King M.S. in Herb. Calc. ex Gamble in Kew Bull. 47 (1913). A parasitic shrub with rather stout dichotomous or opposite branches; branchlets terete, the uppermost with the internodes more or less flattened in alternate directions; nodes only slightly swollen. *Leaves* opposite, thickly fleshy-coriaceous, light yellowish green when fresh, nearly black when dry; obovate, rounded or slightly emarginate at apex, cuneate at base; both surfaces glabrous, slightly shining; margins recurved; 3—4.5 cm. long, 1—3 cm. broad; ribs 5, the outer ones pedately inserted, only slightly visible on the undersurface; other nerves and reticulation obscure; petiole 0. *Flowers* in axillary, shortly pedunculate, clusters of 1—3 supported by 2 connate ovate bracteoles forming a boat-shaped involucre, the middle flower ♀ on a 1 mm. long pedicel, the

two outer ♂ sessile; perianth 4-lobed, lobes ovate, acute, those of ♂ rather larger than those of ♀ and 1 mm. long. *Anthers* 4, sessile by their connective, with few (about 6–7) circular pores. *Ovary* oblong, contracted below the truncate mouth; stigma conical. *Berry* ovoid, pale green, truncate at apex, smooth, 5 mm. in diam.; seed ellipsoid, embryo oblique.

KEDAH: on Kedah Peak, *Ridley* 5847!. PERAK: at lower camp. Gunong Batu Putih *Wray* 1111!.

The anthers in this species, at any rate in the specimens available, are very difficult to make out. They seem at first sight to open longitudinally, but a high power shows the minute pores.

4. *VISCUM DICHOTOMUM*, D. Don Prodr. Fl. Nep. 142 (1825). A leafless pendulous much di-trichotomously branched parasitic shrub, yellow or brown when dry; branches terete, branchlets jointed at the nodes and easily separating when dry, the internodes (articles) flattened, longitudinally (about 5–9-) ribbed, slightly narrowed above attenuate below, each article at right angles to its neighbour but twisted near the base so that all appear to be in one plane; 1.5–4 cm. long, 4–10 mm. (–15 mm. *Koord.*) broad. *Flowers* small, in axillary fascicles of 1–3, when 3 the central flower of the triad usually ♀ the outer ones ♂, triads supported by a pair of connate cup-shaped bracts, the ♀ again bibracteolate the bracteoles 1.5 mm. long; perianth lobes 4, ovate, 1.5–2 mm. long, those of ♂ spreading those of ♀ erect usually deciduous. *Anthers* adnate to the middle of the perianth-lobes, one pair rather larger than the other and more obtuse, pores rather large and conspicuous. *Ovary* cylindrical, smooth, truncate; stigma capitate. *Berry* globular, dull white, smooth, 5 mm. in diam.; seed rugose. DC. Prodr. IV. 284; Engl. & Prantl Naturl. Pflanzenfam. Nachtr. 140. *V. articulatum*, Burm. var. *dichotomum*, Kurz For. Fl. II. 325; Hook. f. Fl. Br. Ind. V. 226; Cooke Fl. Bomb. II. 553. *V. articulatum*, Collett Fl. Siml. 440, t. 143. *V. elongatum*, Wall. Cat. 495; DC. l.c. *V. opuntiioides*, Willd. Sp. Pl. IV. 740; Roxb. Fl. Ind. III. 764; Wall. Cat. 496.

PROVINCE WELLESLEY: at Tassik Glugor, *Curtis*!. PERAK: up to 100 m. alt., *King's Collector* 4191!; at Simpang, *Wray* 2023!; *Scortechini* 603!. MALACCA: *Griffith* K.D. 2742!; *Hervey*!. JOHORE: at Bukit Imlyn, *Ridley*!.—DISTRIB. India, Burma.

I have thought it best to follow Engler in retaining this species, not only on account of the broader articles of the stem for these vary very much, but on account of the larger and more conspicuous flowers and fruits.

5. *VISCUM ARTICULATUM*, Burm. Fl. Ind. 311 (1768). A leafless pendulous much di-trichotomously or verticillately branched parasitic shrub nearly black when dry; branches terete, branchlets jointed at the nodes and easily separating when dry, the internodes (articles) flattened, longitudinally (about 5-) ribbed and narrowed at the ends, each article at right angles to its neighbour, but twisted near the base so that all appear to be in one plane, 1.5—3.5 cm. long, 2—4 mm. broad. *Flowers* very minute, in axillary fascicles (often only one) of triads of which the central flower is usually ♀ the outer ones ♂, triads supported by a pair of connate cup-shaped bracts, the ♀ again bibracteolate, the bracteoles 1 mm. long; perianth-lobes 3—4, triangular, acute, persistent, those of ♂ reflexed, those of ♀ erect. *Anthers* adnate to the bases of the perianth-lobes, at first joined in a central mass, afterwards separate and with very minute pores. *Ovary* cylindric, smooth; stigma small, rounded. *Berry* globular, smooth, glassy-white or yellowish, about 3 mm. in diam. DC. Prodr. IV. 284; Miq. Fl. Ind. Bat. I. i. 806; Kurz. For. Fl. II. 305 (excl. citation of Brandis For. Fl.); Hook. f. Fl. Br. Ind. V. 226; Engl. & Prantl Naturl. Pflanzenfam. Nachtr. 140; Koord. Exkurs. Fl. Jav. II. 167; Cooke Fl. Bomb. II. 553. *V. fragile*, Wall. Cat. 498 B. *V. compressum*, Poir. Encycl. Suppl. II. 861; DC. l.c.; Blume Fl. Jav. Loranth. t. 24. *V. aphyllum*, Griff. Notul. IV. 634 and Ic. Pl. Asiat. t. 630.

PENANG: on Penang Hill, *J. Scott*!; at 300—750 m. alt., *King's Collector* 1686!; on Government Hill, *Curtis* 2151!. MALACCA: *Maingay* K.D. 697!; *Cuming* 2253!. SINGAPORE: at Chanchukang, etc., *Ridley* 8054!.—DISTRIB. India, Burma, Java.

6. *VISCUM FLEXUOSUM*, King M.S. in Herb. Calc. ex Gamble in Kew Bull. 47 (1913). A leafless pendulous much di-trichotomously branched parasitic shrub reaching 2—3 ft. in length, olive brown when dry; branches terete, yellowish; branchlets very slender, jointed at the nodes, the internodes (articles) slightly flattened, longitudinally 1—3-ribbed, linear, scarcely attenuate, each article at right angles to its neighbour but twisted so that all appear to be in one plane; 1.5—2.5 cm. long, 2 mm. broad. *Flowers* minute, in axillary pairs of triads or single, the triads supported by a pair of connate shallow bracts and consisting of a central ♀ flower and two outer flowers of which one or both ♂; the ♀ again bibracteolate, bracteoles .75 mm. long; perianth lobes 3—4, exceedingly minute, scarcely .25 mm. longer in ♀ less in ♂, erect, deciduous. *Anthers*

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adnate to the perianth lobes, pores very minute. *Ovary* ovoid, smooth, truncate; stigma very small, rounded. *Berry* globular, glassy white, 2.5 mm. in diam.

SINGAPORE: *King's Collector* 1187!; Tauglin, etc., *Ridley* 6018!, 8912!; *Murton* 151!.

8. NOTOTHIXOS, Oliver.

Parasitic hoary or tomentose shrubs, growing on the branches of trees or on other *Loranthaceae*; branches dichotomous. *Leaves* opposite, flat, more or less coriaceous, ribbed. *Flowers* minute, monoecious, in terminal spikes or sessile and uniseriate in a row of 3—7 on the margins of a flattened receptacle supported by a pair of small bracts, the said receptacles pedunculate, single or in threes or more in a cyme in the forks of the branchlets; sometimes the ♂ flowers in separate heads near the ends of the branchlets, the ♀ flowers in separate heads lower down, sometimes ♂ and ♀ mixed in the same row. *Perianth*-tube in ♂ short and solid, in ♀ adnate to the ovary; lobes 4 rarely 3 or 5, small, triangular, valvate. *Stamens* in ♂ flowers attached to the bases of the perianth lobes around the sinuate margins of a flattened disk; filaments short or none; anthers erect, broad, dehiscing introrsely by circular pores. *Ovary* in ♀ flowers inferior, crowned by a fleshy disk; stigma subsessile; ovule solitary, at first not apparent. *Fruit* a 1-seeded berry, the pericarp viscid within. *Seed* oblong, on a basal cup-shaped placenta; testa very thin; embryo pendulous in a fleshy albumen, the radicle thickened, the cotyledons short, linear. *DISTRIB*: Ceylon, Malaya and Australia; species about 5.

Branchlets, leaves and inflorescence covered with golden

mossy tomentum 1. *N. subaureus*.

Branchlets, leaves and inflorescence covered with greyish-

tawny stellate tomentum 2. *N. Malayanus*.

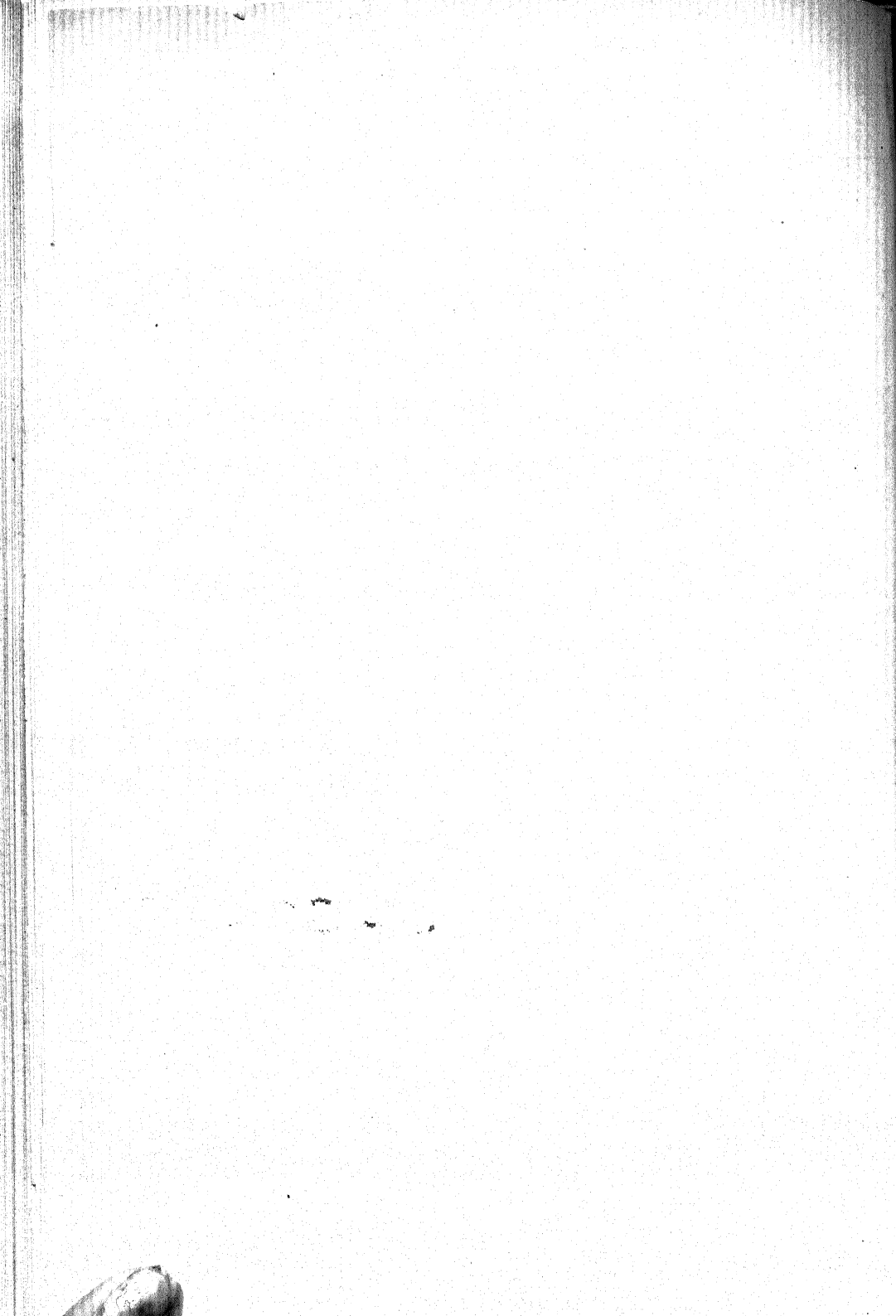
1. NOTOTHIXOS SUBAUREUS, Oliv. in Journ. Linn. Soc. VII. 103 (1864). A parasitic shrub, the young parts, inflorescence and under surface of the leaves densely covered with a golden mossy floccose tomentum; branchlets terete, yellow, striate when dry, the nodes swollen. *Leaves* ovate or elliptic-ovate or ovate-lanceolate, obtuse or acute at apex, narrowed at base; upper surface shining, lower densely stellately floccose-tomentose; variable in size, 2—6 cm. long, 1—3.5 cm. broad; 3-ribbed from the base, the nerves and reticulation not visible; petiole 0—3 mm. long. *Heads* usually 5- or

more-flowered, the flowers uniseriate, usually 1 flower only ♂ the rest ♀; bracts ovate acute; peduncle 4—5 mm. long, often secund. *Perianth*-lobes triangular, usually 4. *Stamens* exceedingly minute, filaments as long as the broadly ovate obtuse anthers which open by about 5—7 pores. *Berry* ovoid-oblong, densely floccose-tomentose. Benth. Fl. Austral. III. 397. *Viscum subaureum*, F. Muell. in Herb. Hook.

PERAK: at Logon, *Herb. Mus. Perak* (*Scortechini?*)!.—DISTRIB. Australia, New Guinea (*H. O. Forbes* 779!).

2. *NOTOTHIXOS MALAYANUS*, Oliv. in Hook. Ic. Plant. t. 1519 (1886). A parasitic shrub, the young parts, inflorescence and under surface of leaves covered with a greyish-tawny tomentum of more or less stellate hairs; branchlets terete, the bark with prominent longitudinal cracks; the nodes flattened. *Leaves* obovate or suborbicular, rounded and slightly apiculate at apex, attenuate at base; upper surface dull, lower tomentose; 2—4 cm. long, 1—2.5 cm. broad; 3-ribbed from the base, the nerves and reticulation not visible; petiole 0—4 mm. long. *Heads* usually 5—7-flowered, the flowers uniseriate; usually 1—2 flowers only ♂ the rest ♀; bracts minute, ovate, acute; peduncle 4 mm. long, erect. *Perianth*-lobes 4, triangular-ovate. *Stamens* very minute; filaments very short; anthers broadly ovate, obtuse, opening by a circle of pores near the margins. *Berry* ovoid-oblong, stellate-tomentose.

PENANG: at Tulloh Babang, *Curtis* 233!.

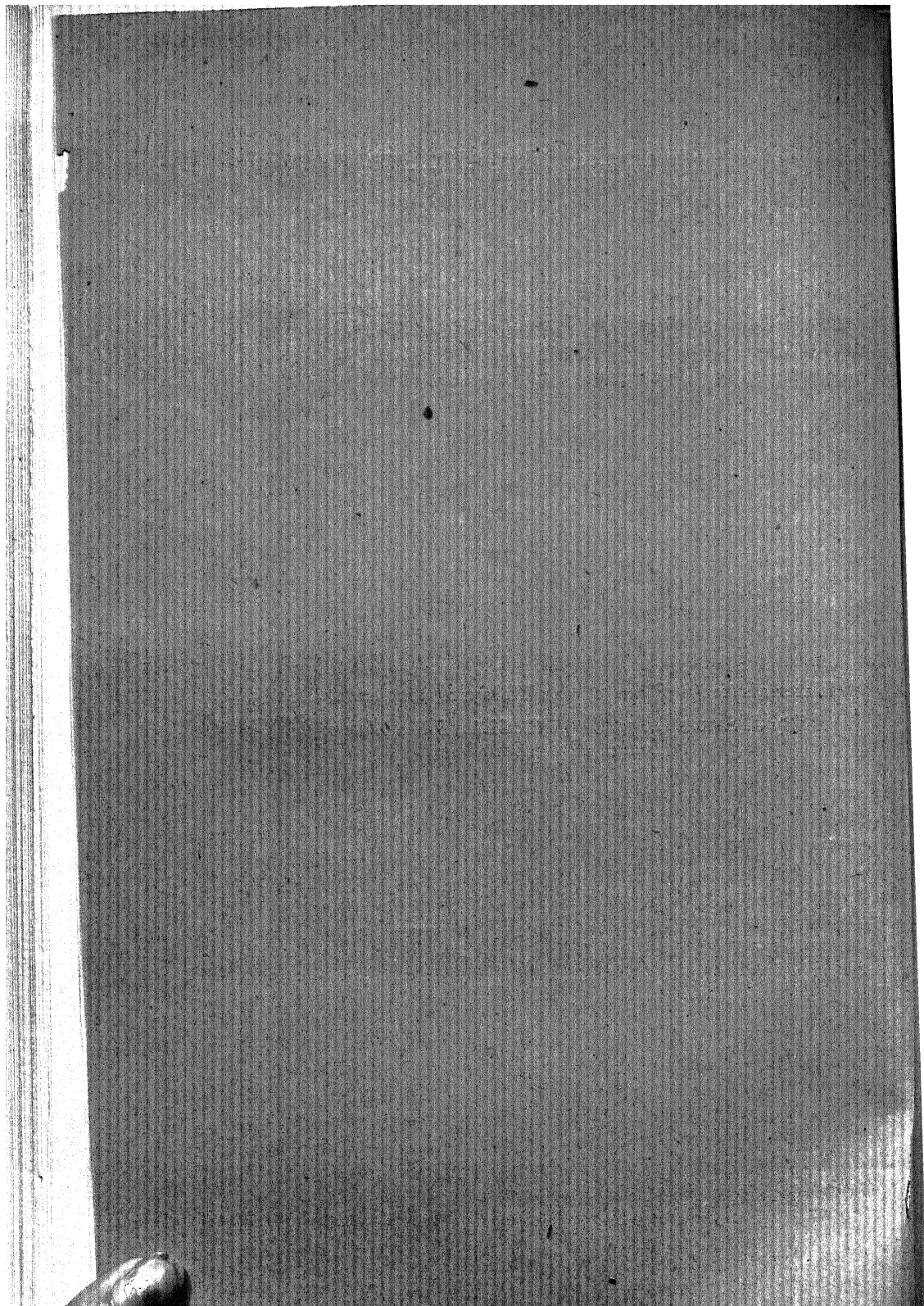


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Materials for a Flora of the Malayan Peninsula, No. 25.

By J. SYKES GAMBLE, C.I.E., M.A., F.R.S., *late of the*
Indian Forest Department.

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Materials for a Flora of the Malayan Peninsula, No. 25.—By J. SYKES
GAMBLE, C.I.E., M.A., F.R.S., *late of the Indian Forest
Department.*

This Part contains the Families No. 96 (*bis*) Cytinaceæ and 109 Balanophoraceæ both by Mr. H. N. Ridley, C.M.G., F.R.S., late Director of the Botanic Garden at Singapore; also Nos. 112 Juglandaceæ, 113 Myricaceæ, 114 Casuarinaceæ, 115 Fagaceæ and 116 Salicaceæ all by Mr. Gamble. In these 7 Families there are 11 genera and 65 species, of which 1 species in Balanophoraceæ and 8 in Fagaceæ are new. The new species have been described, with the usual Latin diagnoses, in the Kew Bulletin.

Family XCVI *bis* CYTINACEÆ.

By H. N. RIDLEY.

Parasitic fleshy herbs, leafless or with a number of scales scattered or imbricate, reduced to a single subsessile flower or with a more or less evolute flower spike. *Flower* unisexual or hermaphrodite, fleshy, campanulate, the tube adnate to the ovary, above broken up into from 3 to 12 lobes. *Stamens* usually innumerable; anthers sessile round the central column, bilocular. *Ovary* inferior or half superior, unilocular or with multilamellate placentas imperfectly plurilocular; stigma single, entire, cupshaped or discoid, or on numerous styles on the top of the ovary or column; ovules very numerous on parietal placentas or pendulous from the apices of loculi, orthotropous or anatropous. *Fruit* fleshy, unilocular, indehiscent or irregularly dehiscent. *Seeds* minute, albuminous —
DISTRIB. Genera 7, species about 25; in temperate or tropical regions of Europe, Asia, Africa and America.

Flower solitary, lobes 5; stigmas numerous .. 1. RAFFLESIA.

Flower solitary, lobes numerous; stigma one, large,
cupshaped 2. BRUGMANSIA.

1. RAFFLESIA, R. Br.

Fleshy unisexual plants, parasitic on woody climbers, stemless, with ovate bracts at the base of the flower adnate to the ovary. *Perianth* very large, fleshy, dull red, fœtid; tube hemispheric, limb 5-lobed; lobes imbricate, spreading, broad, obtuse, glabrous,

with an elevated annular corona in the mouth. *Genital column* short, thick, with a single or double ring surrounding it; apex flat, discoid, with numerous styliform processes. *Male flower* with a single series of anthers surrounding the neck of the column; anthers globose, sessile, opening by a single terminal pore; styli-form processes glabrous. *Female flower* similar, but anthers abortive or absent and styliform processes hairy at the tip. *Ovary* inferior with numerous labyrinthiform placentas; ovules numerous, anatropous. *Seeds* very numerous, minute.—**DISTRIB.** Species about 6, in the Malay Peninsula and Archipelago from Sumatra to the Philippines.

1. *RAFFLESIA HASSELTII*, Suring. Act. Soc. Reg. 1874. *Perianth* about 45 cm. across; scales at base numerous, ovate, rounded, about 1.5 cm. long; tube broad, campanulate, short, covered inside with slender branched processes, upper ones near the mouth unbranched and clubbed; lobes and corona bright Indian-red with dull white irregular elevated blotches scattered over them, lobes oblong, truncate, spreading. *Genital column* thick with one elevated ring, base vertically ribbed; anthers in male flower 20; styliform processes 15 to 17, tapering upwards, 2 cm. long, (when dry) white. Hasselt & Boerlage in Veth, Midden-Sumatra, IV. ii Flora t. 1, 2; Solms-Laubach, Ann. Jard. Buitenz IX 239 and in Engl. Pflanzenreich, *Rafflesiaceæ*, p. 9; Engl. & Prantl. Natürl. Pflanzenfam. III. i. 279, t. 178.

PERAK: Taiping hill forests, *Cantley*, *Wray*; Temengoh Woods, *Ridley*.—**DISTRIB.** Sumatra.

Solms-Laubach in Herb. Kew. labels this *R. Cantleyi*, sp. nov., but seems never to have published any description of it or referred to it in his Monograph in the Pflanzenreich. I cannot distinguish it from *R. Hasseltii*. It occurs sporadically in the dense forests and is used by the Malays as a drug under the name of 'Kerubut.' It emits only a faint odour of carrion.

2. *BRUGMANSIA*, Bl.

Fleshy unisexual or bisexual plants, parasitic on woody creepers, leafless and stemless, with ovate obtuse bracts. *Perianth* smaller than in *Rafflesia*, fleshy, coriaceous; tube adnate to the ovary, above campanulate; lobes elongate, acuminate, induplicate-valvate, five or six, splitting two or three times when expanded, outside glabrous, inside hairy. *Genital column* cylindric; anthers numerous in a single ring below the large cupshaped hairy

stigma, opening by 2 pores. *Ovary* inferior, unilocular; ovules very numerous, on numerous indefinite placentas. *Seeds* minute.—**DISTRIB.** Species 2, one Japanese, and one in Sumatra, Borneo and the Malay Peninsula.

1. *BRUGMANSIA LOWII*, Becc. in Atti Soc. Ital. Sc. Nat. xi. 198 (1868), and Nuov. Giorn. Bot. Ital. (old series) I, 84, t. v and vii, t. 74.

Unisexual. *Perianth* dark brownish-red, about 2 cm. tall and 14 cm across; tube glabrous within; lobes covered with long reddish hair, deflexed, acuminate, 14 to 16 in number when fully expanded. *Column* shortly stipitate; anthers numerous, in the male flower 2-celled, in the female abortive. *Stigma* large, cup-shaped, hairy. Fawcett Trans. Linn. Soc. II, 244, t. 36; Solms-Laubach Pflanzenreich l. c. p. 10.

PAHANG: at Kwala Tembeling, *Ridley*.—**DISTRIB.** Sumatra (*Forbes*), Borneo in Sarawak and Limbang (*Beccari*), Seringok (*Everett*).

Very foetid. *Everett* in litt. says, "It is dark brownish red and exactly resembles a piece of hairy skin. It exhales a putrid odour, and on its being taken into the house, flies were immediately attracted to it and laid their eggs on it. These eggs were hatched out in due time, and the maggots after wandering about the flower died."

Family CIX. BALANOPHORACEÆ.

By H. N. RIDLEY.

Parasitic herbs with a tuberous rhizome and leaves reduced to scales, or bract-like. *Flowers* small, in unisexual or bisexual spikes. *Perianth* of male flowers of 3 to 8 valvate lobes or wanting. *Stamens* 1 to many, filaments free or usually connate, anthers bilocular or 4- to many-locular, often connate. *Perianth* of female flower usually 0, or tubular, or lobed. *Ovary* globose ellipsoid, sessile or stalked, 1- to 3-locular; styles 1 or 2; ovules solitary in the loculi. *Fruit* small, resembling the ovary, one-celled, one-seeded.—**DISTRIB.** Genera 14, species about 40; in the tropics of both hemispheres, Europe and New Zealand.

Styles solitary,

Female flower naked 1. *BALANOPHORA*.

Styles 2,

Female flower with tubular perianth 2. *RHOPALOCNEMIS*.

1. BALANOPHORA, Forst.

Fleshy, red or yellow herbs with a tuberous warty rhizome. *Peduncles* cylindric with large scale leaves, or subfoliaceous yellow leaves. *Spikes* unisexual or bisexual, ovoid or cylindric, dense-flowered. *Perianth* of male flowers stipitate, with 3 to 6 lobes, ovate or oblong, valvate. *Stamens* 3 to many; filaments connate in a cylinder; anthers bilocular with bilocellate loculi or connate into a 3- to many-locellate mass. *Perianth* of minute female flowers 0, the flowers sessile on the receptacle or on the stipes of fleshy cellular bodies (spadicels). *Ovary* ellipsoid with a slender hair-like style and terminal stigma; ovule solitary, pendulous. *Seed* very minute, globose.—**DISTRIB.** Species about 15, in Tropical Asia and Australia. Spikes unisexual, red.

- | | | | |
|---|----|----|-------------------------------|
| Anther cells 5, hippocrepiform | .. | .. | 1. <i>B. gigantea</i> . |
| Anther cells more than 5, linear | | | |
| Rhizome branched, pustular; anther cells 20 or more | .. | .. | 2. <i>B. multibrachiata</i> . |
| Rhizome tuberous not pustular; anther cells about 12 | .. | .. | 3. <i>B. globosa</i> . |
| Spikes slender, unisexual, yellow; perianth lobes in two dissimilar pairs | .. | .. | 4. <i>B. truncata</i> . |
| Spikes bisexual, yellow, slender | .. | .. | 5. <i>B. insularis</i> . |

1. *BALANOPHORA GIGANTEA*, Wall. Cat. 7249 (1828). *Rhizome* tuberous, 15 cm. through, tessellate, not pustulate, dark orange colour, subterranean, bluntly lobed. *Peduncles* up to 10 cm. tall, covered by numerous ovate or lanceolate subcoriaceous obtuse deep red scales. *Male spike* cylindric-conic, densely flowered, the flowers sunk in alveoli, the pedicels as long as the perianth, white. *Perianth-lobes* linear oblong, equal, their apices truncate, incurved, 7 mm. long, bases white, tips deep red. *Androecium* white, compressed, cylindric, obtuse, cells horse-shoe-shaped, 5 ("4 to 6" Fawcett). *Female spike* shortly peduncled, obovoid, top rounded, 3 cm. long, 2 cm. across. *Spadicels* oblong-cylindric, obtuse, stipitate; female flowers borne on the stipes of the spadicel and shorter than it. Fawcett Trans. Linn. Soc. Ser. 2, II, 325, t. 33, fig. 5-7.

PERAK: Ulu Batang Padang near Telom, in dense forest, *Ridley*, at Kinta G(unong) M(alaka?) *King's Collector* 7199. **SELANGOR:** on the roots of a large fig tree, Semangkoh Pass, *Ridley* 8520.—**DISTRIB** Burma, Tonkin.

Kunstler describes the colouring of the plant as light yellow, the stem and leaves as fleshy, the flowers sulphur yellow, calyx deep red. I have described it according to my field notes. It was referred by Hooker fil. Fl.

Brit. Ind. V. 238 to *B. indica*, Wall. from which I consider it to be distinct, as does Fawcett.

2. *BALANOPHORA MULTIBRACTEATA*, Fawcett in Trans. Linn. Soc. Ser. II. ii. 236, t. 34, fig. 15—18 (1886). *Rhizome* dichotomously branched with subterete branches, scarlet, tessellate and sprinkled with papillae; branches about 1 cm. through, the erect flowering ones 3—4 cm. long, broken up at the top into 5 or 6 rounded lobes. *Male spike* 6 cm. long, shortly stalked, lax-flowered, with a few scale-leaves at the base. *Pedicels* 5 mm. long. *Perianth-lobes* 4, linear oblong, obtuse, about 5 mm. long. *Androecium* short, flattened, oblong, with over 20 linear narrow straight cells. *Female spike* shortly oblong, globose, 2 cm. long, 1 cm. wide, shortly peduncled, with a few broad scale-leaves at the base. *Spadicels* oblong, sessile. *Female flowers* very slender on a receptacle about as long.

PAHANG: Gunong Iran, and Telom, Ulu Batang Padang, Ridley, Kloss and Robinson.—DISTRIB. Sumatra.

The branching scarlet rhizome largely above ground and resembling scarlet coral makes this a very beautiful and distinct plant.

3. *BALANOPHORA GLOBOSA*, Jungh. in Nov. Act. Acad. Caes. Nat. Cur. XVIII. Suppl. i. 210, t. 2 (1841). *Tuber* subterranean, often large, 15 cm. through, light brown, tessellate, not pustular, yellow within; branches numerous, short, broad, cone-shaped, split at the top into irregular lobes. Plants unisexual, spikes on very short peduncles, 2—3 cm. long, covered with numerous coriaceous ovate obtuse dark red scales. *Male spike* 2 cm. long, shortly protruding from the scales, red; rhachis rather stout with broad truncate horse-shoe-shaped bracts; the flowers sunk in alveoli, very short, 4 mm. long, shortly stalked. *Perianth-lobes* 5, oblong, truncate, tips incurved. *Androecium* ellipsoid, flattened, with about 12 vertical linear cells. *Female spike* ellipsoid, subglobose, with a broad rounded top, 2 cm. long, hardly protruding from the scales. *Spadicels* oblong, obtuse, sessile, rather large. *Female flowers* shorter, borne on the receptacle.

PERAK: Ulu Batang Padang, Telom, Ridley. PAHANG: Gunong Tahan, Robinson 5413, up to 1800 m. elevation; K'luang Terbag, Barnes. SELANGOR: Semangkoh Pass at from 600 to 1200 m. alt., Ridley. MALACCA: Mt. Ophir, Ridley; Maingay K.D. 140.—DISTRIB. Java.

The commonest species in the Peninsula, parasitic on coniferae, *Dacrydium*, etc. Junghuhn only describes and figures the female, but I have little doubt that this is the plant he intended. A rhizome from Java from De Vriese, who calls it *B. globosa*, is identical with the Peninsular species. Fawcett, however, refers it to his species *B. ramosa*.

4. *BALANOPHORA TRUNCATA*, Ridl. in Journ. Linn. Soc. XLI, 296 (1912). *Rhizome* tuberous, as large as the fist, deeply buried, tessellate and papillose, not pustular. *Male flower stems* 7 to 20 cm. long, slender, dirty yellow. *Leaves* sheathing the basal portion 3 to ∞ , rather distant, lanceolate, obtuse to oblong, 2 to 3 cm. long. *Flower spike* lax, slender, 4—9 cm. long; flowers sessile, transversely oblong, 5 mm. wide by 2 mm. across. Outer *perianth-lobes* 2, transversely oblong, inner pair linear oblong, much narrower, obtuse, truncate, yellow. *Androecium* white, transversely oblong; cells parallel, linear, very numerous. *Female flower spike* not seen.

PERAK: Ulu Batang Padang at about 900 m. elevation, parasitic on a woody climber, *Ridley*. SELANGOR: Mt. Menuang Gasing between 900 and 1500 m. elevation, *C. B. Kloss*.

This is allied to *B. polyandra*, Griff., but is more slender and with very differently shaped perianth lobes.

5. *BALANOPHORA INSULARIS*, Ridl. in Journ. Roy. As. Soc. Str. Br. XLV. 218 (1905). *Rhizome* rather small, about 2 in. through, nodular and warted. *Stems* one or more with a small volva split into 4 or 5 rounded lobes at the base, 8—9 cm. tall, entirely lemon yellow, 3 mm. thick. *Leaves* oblong, linear, blunt, 2 cm. long, 1 cm. wide, tips often denticulate. *Spike* with scattered male flowers at the base; apex ellipsoid-ovate, female. *Male flowers* 1 mm. across; perianth lobes oblong, truncate, upper and lower ones longer and wider than the lateral ones. *Androecium* transversely oblong, cells 7—8, hexagonal. *Female flowers* shortly stalked, with numerous obovate tailed spadixes; ovary obovoid, minutely pustulate.

PERAK: Lenggong, *Ridley*. PAHANG: East coast on Pulau Aur, *Feilding*.—DISTRIB. Christmas Island.

2. RHOPALOCNEMIS, Jungh.

Fleshy parasitic herbs, yellow or red. *Rhizome* tuberous or elongate, scales and leaves absent. *Spikes* unisexual, sessile or stalked, cylindric, many-flowered. *Flowers* of both sexes minute, imbedded in a mass of filiform cellular hairs; bracts peltate, conic,

stalked, angled, umbrella-shaped, covering the spikes at first, then deciduous. *Male flowers* infundibuliform with lacinate margins, or of 4 obtuse-oblong truncate lobes; stamens 2, connate, anther-cells numerous, linear, connate. *Female flower*: perianth tubular or bilobed, lobes rounded; styles 2, stigmas discoid; ovule 1, pendulous. *Seed* globose, albumen thin, embryo large.—**DISTRIB.** Species 2. One in Java and the Himalayas and one in the Malay Peninsula.

1. *RHOPALOCNEMIS RUFICEPS*, Ridl. in Kew Bull. 188 (1914). *Rhizome* elongate, terete, over 15 cm. long, branched, 5 mm. through, yellow becoming orange-brown outside. *Leaves, scales and volva* none. *Stems* columnar, terete, 8–10 cm. long, 7 mm. through, yellow with brown transverse streaks. *Capitulum* ovoid to cylindric, 4–10 cm. long, 2–3 cm. through, rose pink covered with bright red bracts; bracts stipitate, cone-shaped, 4- to 6-angled (when dry), 5 cm. long and 4 mm. across the widest part; soon deciduous. *Male flowers* 2 mm. long, perianth lobes 4, oblong, truncate, shortly connate at the base; androecium shorter, column thick; anthers ellipsoid in an obtuse oblong head with about 8 linear loculi. *Female flowers* minute, flattened; perianth elliptic, tubular; styles 2, stigmas discoid. Hairs in both sexes very numerous, dense, enclosing the flowers.

PENANG: *Stoliczka* (in herb. Cale.); Penara Bukit, *Ridley*.
PERAK: Taiping Hills in dense forest, Low, *Ridley*, *Anderson*.

Very distinct from the only other described species, *R. phalloides*, Jungh., in the slender creeping rhizome, the absence of any volva, the tall cylindric peduncle and cylindrical red capitulum.

Family CXII. JUGLANDACEÆ.

Trees, usually large, with hard wood, often strongly aromatic. *Leaves* alternate, pinnate, stipules 0. *Flowers* monoecious: ♂ in catkins in simple or paniculate pendulous spikes; perianth 0 or of 3–6 lobes adnate to the bract: ♀ in erect, sometimes afterwards pendulous, few or many-flowered spikes or racemes; perianth 4-lobed, superior; bract inferior, often enlarged in fruit. *Stamens* 2 or more, on the perianth-lobes; anther-cells parallel; filaments very short or 0. *Ovary* inferior, 1-celled; ovule solitary, erect, orthotropous; style short; stigmas 2, short sessile or long, lacinate. *Fruit* a drupe or nut, naked or clothed with the marcescent bract and perianth-lobes; pericarp fleshy or succulent; endocarp hard, bony.

or crustaceous, sometimes dehiscent, with sinuously inflexed inner walls and 2—4 basal pits within. *Seed* basifixed, 2—4-lobed at base; albumen 0; cotyledons equal, sinuous or subfoliaceous and contorted; radicle superior.—**DISTRIB.** Genera 5, chiefly in North Temperate regions, a few species tropical.

1. ENGELHARDTIA, Lesch.

Trees, often of large size. *Leaves* pinnate, the leaflets entire or serrate often with the under surfaces covered with glandular scales. *Flowers* monœcious, in paniculate spikes or racemes, usually the lower branches ♂, the terminal one ♀, sometimes the ♂ lateral or axillary on the wood of the previous year, the ♀ from the axil of the new year's shoots; ♂ erect or pendulous, ♀ pendulous; both ♂ and ♀ supported by bracts, which in the ♀ are persistent and become expanded in fruit. *Perianth* in ♂ irregularly but usually 4-lobed, in ♀ usually 4-lobed and surmounting the ovary. *Stamens* 4—12, subsessile on the perianth lobes. *Ovary* inferior, 1-celled, 1-ovuled; ovule erect, orthotropous; style short; stigmas 2, short, sessile or long lacinate and inwardly stigmatose, often 2 fid. *Fruit* a small globose nut, adnate to the much enlarged, 3—6-lobed, scarious, net-veined bract, three lobes usually much elongate, the mid-lobe the longest; epicarp or perianth-tube thin, stiffly hirsute or covered with glandular scales; endocarp 2-valved. *Seed* 2—4-lobed at the base, the cotyledons rugosely folded and contorted.—**DISTRIB.** Species 6 (if *E. aceriflora* and *E. Colebrookiana* are considered as varieties of *E. spicata*) in India, China and the Malay Peninsula and Archipelago.

Fruit covered with acicular hairs; perianth of ♂ flowers irregular.

Fruiting bract 4-lobed, cupshaped at base, the inner lobe obtuse, short, crenate or emarginate, the 3 outer much enlarged; leaves large, up to 30 cm. long, usually membranous . . .

1. *E. spicata*.

Fruiting bract 3-4-lobed, cleft within to the base, the inner lobe short, acute, the 3 outer much enlarged; leaves up to 15 cm. long, coriaceous . .

2. *E. nudiflora*.

Fruit covered with glandular scales; perianth of ♂ flowers regular, 4-lobed; fruiting bract 3-lobed, cleft within to the base, the inner lobe absent, the outer 3 much enlarged; leaves coriaceous, 20—30 cm. long.

3. *E. Wallichiana*.

1. **ENGELHARDTIA SPICATA**, Blume Bijdr. 528 (1826) and Fl. Jav. Jugland, 8, tt. 1 and 5A (1828). A large subdeciduous tree,

reaching in Java 30 m. or more in height; branchlets greyish brown, lenticellate, the uppermost more or less pubescent and often with rounded glandular scales. *Leaves* paripinnate with 3—7 pairs of opposite or subopposite leaflets, membranous or chartaceous, up to 30 cm. long in all, petiole 5—10 cm. long; leaflets petiolulate or subsessile, elliptic-oblong or -ovate, acute or acuminate at apex, rounded or attenuate, usually unequally, at base; margins entire; both surfaces smooth, olive brown when dry, the under sometimes softly pubescent; 10—18 cm. long, 4—6 cm. broad; mainnerves 10—12 pairs, curving to near the margin, reticulation areolate. *Flowers* in slender pendulous pubescent spikes: ♂ spikes up to 30 cm. long, deciduous; bracts entire or trifid, at apex bearing 3 or more irregular oblong perianth-lobes embracing the stamens, the end lobe often elongate; stamens in two rows of about 6 each, anthers oblong, hispid, shortly apiculate, filaments very short: ♀ spikes also up to 30 cm. long; bract cup-shaped, 5-lobed, the lobes unequal; perianth-lobes 4—5, narrow, superior, persistent and often reflexed; ovary, as also the base of the bract, densely clothed with stiff acicular hairs; style short, stigmas 4, slender, papillose. *Fruit* a globose crustaceous nut, 5 mm. in diam., covered with stiff acicular hairs and crowned with the persistent perianth-lobes and style; cupular bract scarious, embracing the base of the nut, 4-lobed, the 3 outer lobes much enlarged, the midlobe obovate or spatulate, 3—4 cm. long, up to 1—5 cm. broad, the 2 side lobes similar but only half as long, the inner lobes short emarginate or crenate, about 5 mm. long, the whole involucre prominently net-veined and glabrous. C. DC. Prodr. XVI. ii. 140; Kurz For. Fl. II. 491; Miq. Fl. Ind. Bat. I. i. 842; Hook. f. Fl. Br. Ind. V. 595; Engl. & Prantl Naturl. Pflanzenfam. III. i. 24, Figs. 19 B, 20 B; Koord. & Val. Bijdr. V. 165; Koord. Exkurs. Fl. Jav. II. 51; Brandis Ind. Trees 620; Prain Beng. Plants, 984. *E. Roxburghiana*, Lindl. in Wall Pl. As. Rar. II. 87, t. 199 (the fruit only); Wall. Cat. 490; Brandis For. Fl. 500. *Juglans pterococca*, Roxb. Fl. Ind. III. 631 (in part only).

PERAK: *King's Collector* 1621; at Temango, *Ridley* 14494!.—
DISTRIB. India, Burma, Malay Archipelago, Philippines.

2. *ENGELHARDTIA NUDIFLORA*, Hook. f. Ic. Pl. 1747 (1888) and Fl. Br. Ind. V. 597. A lofty tree; branchlets pale brown with conspicuous lenticels, the uppermost tawny-pubescent and glandular. *Leaves* paripinnate with 2—6 pairs of opposite or subopposite leaflets, coriaceous, 10—15 cm. ^{at} ~~in~~ ^{all} in all; leaflets subsessile, elliptic or

obovate, obtuse at apex usually with a short acute point, attenuate or cuneate more or less unequally at base; entire or subcrenate on the margins; the upper surface dark and shining when dry the lower ferruginous-brown nearly glabrous and glandular; 3–8 cm long, 2–3 cm. broad; nerves 6–10 pairs, somewhat impressed above, prominent beneath. *Flowers*: ♂ in slender axillary spikes 2–4 cm. long, bracts subpeccinately lobed in minutely antheriferous lobes, anthers ellipsoid, hispidulous: ♀ in subsolitary slender axillary spikes 5–8 cm. long, erect in flower pendulous in fruit; bracts 3 fid, very glandular, the midlobe the longest; perianth-lobes 4, triangular acute, recurved in fruit; ovary orbicular, stiffly hirsute; style slender, divided into 2–4 filiform stigmas. *Fruit* a small globose nut, about 4 mm. in diam., covered with stiff acicular hairs and surmounted by the persistent perianth lobes; cupular bract much enlarged, cleft nearly to the base within and divided on the outside into three scarious spatulate lobes, the mid-lobe 3–4 cm. long and up to 1 cm. broad, the side-lobes about half as long, all three prominently net-veined and covered with glandular scales (inside is a short acute fourth lobe, sometimes absent).

PENANG: Government Hill, *Maingay* K.D. 1510!. PERAK: at Bruas Dindings, a tall slender tree with red fruit, *Ridley* 7213!. SINGAPORE: in garden jungle, *Ridley* 5905!.

var. *crenata* Hook f. M.S. in Herb. Kew. Leaflets prominently crenate, very unequal at base; fruiting bracts with the side lobes frequently winged and the small inner lobe more expanded. *E. serrata*, Hook. f. in Fl. Br. Ind V. 596 not of Blume.

PENANG: at Muka head, 150 m. alt., *Curtis* 716!.

It would be interesting, as Sir J. D. Hooker suggested, to obtain ♂ flowers of this var.; it is not impossible that it may prove to be a distinct species. I do not think it is *E. serrata*, Bl., of which I have seen specimens in the Kew and Calcutta Herbaria.

3. *ENGELHARDTIA WALLICHIANA*, Lindl. in Wall. Cat. 4942 (1828). A tall densely foliaged tree, reaching a height of 24–30 m. of stem; branchlets slender, dark grey, smooth, the uppermost minutely tawny-puberulous. *Leaves* paripinnate with 2–4 pairs of leaflets, subopposite or alternate, coriaceous, 20–30 cm. long in all, the petiole 5–10 cm. long; leaflets petiolulate (about 1 cm.), sub-falcately lanceolate, long but obtusely acuminate at apex, narrowed and somewhat decurrent at base; margin entire, reflexed; both

surfaces smooth, glabrous, yellowish-green when fresh, olive-brown when dry; 10–16 cm. long, 3–5 cm. broad; main nerves 12–14 pairs, curved to join in loops near the margin, reticulation areolate. *Flowers* in spikes or racemes in spreading sub-rect panicles: ♂ spikes 5–10 cm. long; bracts minute, 3-lobed, covered with glandular scales; perianth-lobes 4, obovate, cucullate, also densely glandular without, each bearing usually 3 stamens, one at base two a little higher up, anthers minute, suborbicular, nearly sessile: ♀ in tawny-puberulous racemes reaching 20 cm. in length; pedicels 3–5 mm. long, curved upwards; bracts cup-shaped, 3 lobed; perianth-lobes 4 as in ♂, surmounting the glandular depressed-orbicular ovary; style very short, stigmas 4 spreading calucons. *Fruit* a globular nut 5–6 mm. in diam., closely covered with golden round glandular scales and surmounted by the hardened persistent perianth-lobes; cupular bract at first small, then gradually expanded into a 3-lobed scarious involucre cleft to the base on the inner side, the mid-lobe spatulate, 4 cm. long by 1–1.5 cm. broad, the side lobes oblong 2–2.5 cm. long by 8 mm. broad, the whole involucre prominently net-veined, with glandular scales and scurfy on the nerves. C. DC. Prodr. XVI. ii. 141; Hook. f. in Fl. Br. Ind. V. 596. *E. chrysotepis*, Hance in Ann. Sc. Nat. Sér. 4 XV. 227; Baill. Hist. Pl. XI. 403, fig. 469. *E. Roxburghiana*, Lindl. in Wall. Pl. As. Rar. II. 87 t. 199 (*in part only*, i.e. *all but the fruit*). *Juglans pterococca*, Roxb. Fl. Ind. III, 631 *in part only*.

PENANG AND SINGAPORE: Wallich 4942!. PENANG: Government Hill, 2000 ft. Maingay K.D. 1599!; Curtis 56!; King's Collector 1799!; Ridley 9367!. PERAK: in old dense forest about Larut at 1000 m. alt., King's Collector 2915!; Scortechini!; Wray!.—DISTRIB. China, Tonkin.

The plate in Wallich Pl. As. Rar. clearly represents this species except the drawing of the fruit, which belongs to *E. spicata*. The plate is copied from Roxburgh's drawing of *Juglans pterococca* and the description in Roxb. Fl. Ind. except as regards the female flowers and fruit clearly belongs, as suggested by Hook. f. in the Fl. Br. Ind., to this species also.

Family CXIII. MYRICACEÆ.

Glandular and aromatic trees or shrubs. *Leaves* alternate penninerved, simple or rarely pinnatifid, entire serrate or irregularly dentate; stipules 0. *Flowers* unisexual, dioecious or rarely monoecious, in bracteate catkin-like spikes; the male spikes solitary,

fascicled or paniced, the female spikes axillary, the bracts 1—4 flowered; in monœcious species the male flowers below, the female above. *Male flowers*: stamens 3—6, rarely more, on a torus adnate to the bract; filaments short, free or connate; anthers erect, 2-celled. *Female flowers*: ovary 1-celled, sessile, with 2—4 minute bracteoles; style bifid, inwardly stigmatose; ovule 1, erect, orthotropous. *Drupe* ovoid or globose with a resinous, often papillose, succulent or waxy exocarp and hard endocarp. *Seed* erect; testa membranous, albumen 0; embryo straight, cotyledons plano-convex, radicle short, superior. Genus 1.

1. MYRICA, Linn.

Characters of the Family.

DISTRIB. Species about 63, in temperate and tropical regions, not yet reported from Australia.

1. MYRICA *ÆSCULENTA*, Buch.-Ham. in D. Don Prodr. Fl. Nep. 56 (1825). A small evergreen dioecious tree or large shrub, sometimes reaching 10 m. in height; branches rather stout with smooth greyish brown bark, branchlets pale, lenticellate, the uppermost brownish-pubescent. *Leaves* coriaceous, crowded towards the ends of the branchlets; oblanceolate or obovate, rounded or obtuse or obtusely acute at apex, cuneate at base; slightly pubescent beneath when young, especially on the midrib, and sparsely covered with circular resinous glands, glabrous on both surfaces when old, when dry the upper surface nearly black, the lower purplish-brown; margins entire or serrulate towards the tip, those of young shoots often prominently dentate; 4—12 cm. long, 2—4 cm. broad; midrib prominent on both surfaces; main nerves 10—15 pairs, usually nearly at right angles with the midrib, joining in loops near the margin; secondary nerves short, reticulation areolate; petiole 4—6 mm. long, tuberculous. *Flowers*: ♂ in panicles 4—5 cm. long; catkins in clusters on a pubescent rachis and its branches, the catkins up to 3 cm. long; each catkin subtended by an ovate cordate bract about 1.5 mm long, covered with glandular scales; flowers in each catkin about 10—12, each with a small ovate cordate flowering bract and 3—6 stamens; anthers orbicular, 2-celled, filaments short: ♀ in simple spikes up to about 4 cm. long; rachis grey-pubescent; flowers in each catkin about 3, subtended by an ovate obtuse glandular-scaly bract about 1 mm. long, each flower with a bract about 0.5 mm. long; styles long; scales at the base of the ovary 2—3, very minute.

Fruit an ellipsoid flattened drupe 0.5—1 cm. long, the exocarp covered with dense brown hair and red clavate fleshy papillose processes; endocarp thick, bony, rugosely pitted without. Chevalier Monog. Myric. 120 (1901), *M. sapida*, Wall. Tent. Fl. Nep. t. 45 and Cat. 6811; C. DC. Prodr. XVI. ii. 151; Brandis For. Fl. 495. *M. integrifolia*, Roxb. Fl. Ind. III. 765 (1832); C. DC. l.c. 151; Wight l.c. tt. 764, 765; Wall. Cat. 6312. *M. missionis*, Wall. Cat. 7297; C. DC. l.c. 152. *M. Farquhariana*, Wall. Tent. l.c. 61; Cat. 6813; C. DC. l.c. 152. *M. Nagi*, Hook. f. in Fl. Br. Ind. V. 597 non Thunb.; Kurz For. Fl. II. 475; Collett Fl. Siml. 475 t. 151; Brandis Ind. Trees 620.

PAHANG: at Peeken and Kwala Brawas, *Ridley* 1076!, 1567!. MALACCA: *Griffith* K.D. 5008!; *Mainqay* K.D. 1347; at Bukit Bruang and Bukit Kajan, *Alwis*!, Vern. 'Poko Golinche' and 'Poko Kusama.' SINGAPORE: *Wallich* 6813!; a bushy tree on the seashore at Toas, *Ridley* 297!; in Woodland at Kranji. *Ridley* 297; at Bajan, Vern. 'Kayteng' *Ridley* 3955.—DISTRIB. India, China, Japan.

Var. *auriculata*, Gamble. *Leaves* auricled at the base, main nerves more conspicuous beneath. *Flowers* in catkins, clustered on the rhachis of a simple spike 2—4 cm. long; bracts of each catkin acuminate, reflexed, 2 mm. long, those of each flower acute, 1 mm. long.

PAHANG: at Gunong Tahan, up to 1500 m. alt., July 1905. *Wray* and *Robinson* 5519!.

Family CXIV. CASUARINACEÆ.

Trees or shrubs; branches woody; branchlets subherbaceous, cylindric, grooved, jointed, the internodes ending in a short whorled sheath of connate subulate scales, which represent the leaves, the branchlets having the habit of *Ephedra* or *Equisetum*. *Flowers* monœcious or dioecious: ♂ in whorls in terminal spikes of short superposed toothed cups, each flower 2-bracteolate; ♀ in ovoid or globose heads, bracteate and bracteolate. *Perianth*: ♂ of 1 or 2 concave segments, circumscissile at the base and pushed off by the anther eventually; ♀ none. *Stamen* 1, inflexed in bud; anther large, the cells distinct placed back to back but free above and below, dehiscing longitudinally. *Ovary* minute, 1-celled; style short, then bifid with long filiform red arms stigmatose to the base; ovules 2, collateral, semi-anatropous. *Fruit* an oblong or cylindric cone

formed of the enlarged hardened bracts and bracteoles, which together make 2-valved cavities enclosing the achenes; achenes compressed, thin above and with many spiral vessels, crustaceous below, winged terminally and tipped by the style. *Seed* by abortion solitary, laterally attached; testa membranous; albumen 0; cotyledons flat, equal, fleshy: radicle superior.—DISTRIB. 1 genus.

1. CASUARINA, Forst.

Characters of the Family.

DISTRIB. About 23 species, chiefly Australian, a few only Malayan and Pacific, one extending to the E. Coast of the Bay of Bengal.

1. CASUARINA EQUISETIFOLIA, Forst. Char. Gen. 103, t. 53 (1776). A very tall tree with drooping branches, the younger ones covered with the recurved remains of the scales; branchlets filiform, internodes about 4—6 mm. long, sheaths with 6—8 scales (leaves) usually 8. *Flowers* monœcious: ♂ spikes cylindric or elongate-clavate, 1.5—2 cm. long, flowers in whorls of usually 8; bracteoles lanceolate-penicillate; perianth lobes unequal, hooded: ♀ in subglobose heads about 5 mm. long, bracteoles minute. *Fruit* cones globular-oblong about 1 cm. in diam., with about 12 rows of achenes in puberulous hardened bracts. Miq. Fl. Ind. Bat. I.; 875 and in DC. Prodr. XVI. ii. 338; Brandis For. Fl. 435 and Ind. Trees, 620; Kurz For. Fl. II. 494; Benth. & Von Mueller Fl. Austral. VI. 197; Hook. f. Fl. Br. Ind. V. 538; Engl. & Prantl Naturl. Pflanzenfam. III. i. 17, Fig. 15 A—L; Koord. & Val. Bijdr. X. 272; Koord. Exkurs. Fl. Jav. II. 7; Plain Beng. Plants 985. *C. muricata*, Roxb. Fl. Ind. III. 519; Wall. Cat. 6815. *C. littorea*, Rumph. Herb. Amb. III. 86, t. 57.

PAHANG: at Pekan and Sungei Meang, *Ridley*!—DISTRIB. Coast of the Bay of Bengal, from Chittagong southwards; coast of the China sea; Malay Archipelago, Pacific Islands, Australia, elsewhere frequently cultivated in most tropical regions.

Family CXV. FAGACEÆ.

Trees or rarely shrubs. *Leaves* simple, alternate, penninerved, entire toothed or lobed; stipules free, caducous. *Flowers* minute, usually monœcious, occasionally diœcious, sometimes hermaphrodite; males in erect or pendulous catkins or spikes or rarely

cymosely capitate; females in spikes or capitate or solitary; bracts sometimes involucrate. *Perianth*: ♂ usually 6- occasionally 4-7-lobed, membranous, the lobes free or connate: ♀ usually as in ♂ but smaller, free or adnate to the ovary, usually with an involucre and many imbricate scales. *Stamens* usually 6 or 12, sometimes fewer, occasionally more, adnate to the base of the perianth, filaments slender, anthers dehiscing longitudinally. *Ovary* in ♂ flowers reduced to a rudimentary pistillode or 0: in ♀ more or less completely 3-6-celled, the cells 2-ovuled; ovules pendulous anatropous; styles as many as the cells; stigmas terminal, often minute. *Fruit* a nut, sometimes 1-4 nuts, included within or surrounded by often greatly enlarged involucrate bracts forming a cupule; pericarp coriaceous or woody. *Seed* pendulous, usually solitary; testa membranous; albumen 0; cotyledons thick, fleshy, plano-convex or sinuate, sometimes indented in star-like fashion, sometimes ruminate; radicle superior.—*DISTRIB.*: Genera 5, chiefly of north temperate regions or of hilly districts in the tropics.

Nut (acorn) 1 only; cupules cup-shaped or saucer-shaped or completely enclosing the acorn.

Male spikes pendulous; stamens usually 6; stigmas broad, covering the inner surface of the summit of the recurved styles or capitate on them; cupule (in Malay Peninsular species) lamellate, surrounding the lower part of the acorn only; leaves usually serrate or lobed

1. *QUERCUS*.

Male spikes erect; stamens usually 12; stigmas consisting of a pore, terminal on the slightly curved styles; cupule of imbricate scales or lamellate or entirely enclosing the acorn, sometimes smooth, occasionally spiny; leaves usually entire, rarely serrate

2. *PASANIA*.

Nuts 1 or up to 4; cupules enclosing the nuts, often splitting irregularly, usually armed with spines or clusters of spines or sometimes tubercular only; stigmas as in *Pasania*; leaves entire or serrate

3. *CASTANOPSIS*.

It will be seen that I have preferred, with a slight modification, to adopt the genera proposed by Prantl in Engler's 'Natürlichen Pflanzenfamilien' and to subdivide the old genus *Quercus* under which the Malay Peninsular Oaks were described by Sir G. King in his Monograph and by Sir J. D. Hooker in the Flora of British India into the two very well marked genera *Quercus* and *Pasania*, rather than to follow the more detailed subdivision preferred by Oers. ed in 1856 or by Schottky in 1912. The genus *Castanopsis*, at any rate so far as the species with one nut in the cupule is concerned, comes very near to *Pasania*, especially to those species which have prickly cupules.

I. QUERCUS, L.

Trees or shrubs, deciduous or evergreen. *Leaves* toothed or lobed, rarely entire. *Flowers* monœcious: ♂ solitary or 1—3 together, in pendulous catkins; ♀ solitary in erect few-flowered spikes. *Perianth*: ♂ cup-shaped, thin, with usually 6 sometimes 3—5 lobes supported by small bracteoles: ♀ as in ♂, but smaller, free or adnate to the ovary, surrounded by an involucre of many imbricate or annular scales. *Stamens* usually 6, sometimes fewer; filaments slender; anthers rather large. *Ovary*: in ♂ flowers 0 or reduced to a villous pistillode; in ♀ flowers 3-celled, the cells 2-ovulate; styles usually 3, short, recurved; stigmas broad, lining the inner faces of the styles. *Acorn* ovoid globose or turbinate, seated on or partly enclosed in a cup-shaped or saucer-shaped cupule, the involucreal scales hardened into teeth or tubercles or annular lamellæ; pericarp crustaceous or coriaceous; surmounted by an umbo consisting of the persistent styles. *Seed* 1; testa membranous; cotyledons fleshy, plano-convex.—DISTRIB. Temperate regions of the Northern Hemisphere, a few only extending down into the mountains of Malaya, about 200 species (Prantl).

According to Prantl in Engler and Prantl's 'Natürlichen Pflanzenfamilien' the genus is divisible into 3 Sections, all the species of the Malay Peninsula and Islands belonging to the Section CYCLOBALANOPSIS in which the involucreal bracts forming the cupule are united to form concentric lamellæ with entire crenate or denticulate margins, and the leaves are dentate or serrate.

Leaves with silvery scales on the lower surface, serratures near the apex obscure and shallow; acorn-cupules obconic at base, then hemispheric, with 8—10 minutely denticulate lamellæ, 2 cm. deep .. 1. *Q. argentata*.

Leaves glabrous on the lower surface, serratures near the apex prominent.

Leaves 10—18 cm. long; cupule cylindric-hemispheric, 2—2.5 cm. in height and depth, the lamellæ thin tomentose 2. *Q. oideocarpa*.

Leaves 5—7 cm. long; cupule slightly obconic below then cylindric, 1—5 cm. in height and diam., 2 of the lower belts much thickened, the rest thin 3. *Q. turbinata*,
var. *crassilamellata*.

1. QUERCUS ARGENTATA, Korth. in Verh. Nat. Gesch. Bot. 215, t. 47, fig. 1—17 (1839—42). A tree; branchlets stout, rough, very prominently lenticellate. *Leaves* coriaceous; elliptic-oblong, oblong-lanceolate or oblanceolate, abruptly and somewhat obtusely

caudate-acuminate at apex, acute or acuminate at base; margin entire or the upper third very obscurely repand-serrate with 4—5 teeth; upper surface shining, glabrous, olive-brown when dry, lower dull with a layer of minute silvery scales; 10—20 cm. long, 4—8 cm. broad; midrib slender, prominently impressed above and raised beneath; main nerves 10—15 pairs, regular, rather indistinct, curved to near the margin and then joining in small loops; transverse nervules very many, subparallel, faint like the reticulation; petiole slender, 1.5—3 cm. long, grooved. *Spikes*: ♂ in axillary or lateral panicles up to 3 cm. long; rhachis of panicle angled, subglabrous, of spikes tawny villous; bracts of spikes linear-subulate, 3 mm. long; bracteoles ovate-acute, 1.5 mm. long; ♀ lateral, 2—5 cm. long, stout; rhachis densely lenticellate and rough. *Flowers* in each cluster 3; perianth cup-shaped, obscurely 3-lobed; stamens 4—6. *Fruit* sessile; mature cupule obconic at base then hemispheric, embracing about half the acorn, 2.5 cm. in diam., 2 cm. deep; lamellæ about 8—10, thin, broad, subequal, grey-puberulous, minutely denticulate; acorn ovoid, chestnut-brown, smooth, shining, 3 cm. long, 2 cm. in diam., the umbo truncate-conic. Blume Mus. Bot. Lugd.-Bat. I. 299; A. DC. in Prodr. XVI. ii. 91; Miq. Fl. Ind. Bat. I. 853; Ann. Mus. Lugd.-Bat. I. 115; Wenzig in Jahrb. Bot. Gart. Berl. IV. 230. King Ann. Calc. II. 30, t. 24 A. *Cyclobalanopsis argentata*, Oerst; in Kjoeb. Vidensk. Meddel. 79 t. I. II. 5 to 8 (1866).

MALACCA: at Batu Tiga, Vern. 'Pinang Pinang' Holmberg 770!. SINGAPORE: in garden jungle, Ridley 6443!.—DISTRIB. Sumatra Korthals, Forbes 2719, 2753; Bangka Teysmann; Borneo Hallier 2864! (♂ flowers).

The description of the ♂ flowers (unfortunately still in bud-stage) is taken from Hallier's specimen, that of the fruit from a ripe acorn collected by Ridley, as the fruits described by King and his predecessors were admittedly immature.

2. *QUERCUS OIDOCARPA*, Korth. in Verh. Nat. Gesch. Bot. 216, t. 47. fig. 18 (1839—42). A large tree reaching 30 m. in height and 60—90 cm. in diam. of stem; branchlets brown, stout, with many prominent lenticels, the uppermost puberulous; buds ovoid, small, pubescent. *Leaves* coriaceous; elliptic-oblong or oblanceolate, acuminate at apex, acute or acuminate and sometime unequal at base; upper surface glossy green when fresh, reddish-brown and shining when dry, lower dull, smooth, glabrous; margin entire below, prominently serrate in the upper fourth part with about 2—4 incurved fairly deep serratures; 10—18 cm. long, 3.5—6 cm. broad;

midrib stout, raised on both surfaces; main nerves 8—12 pairs slightly prominent on the upper, more so on the lower surface, curved to close to the margin; transverse nervules prominent, subparallel, enclosing the prominent reticulation; petiole 2—3 cm. long, slender. *Spikes*: ♂ unknown: ♀ solitary, shorter than the leaves, flexuous, stout especially in fruit. *Fruit* sessile; cupule cylindric-hemispheric embracing one half to three-fourths or even more of the acorn, 2—2.5 cm. in diam. and depth; lamellæ 6—8, broad, thin, minutely tomentose, the margins of the lower boldly crenate, of the upper subentire; acorn ovoid-globose, with a slightly flattened top and conical zoned umbo minutely tomentose, 2—3 cm. long, 2—2.5 cm. in diam. Blume Mus. Bot. Lugd.-Bat. I 302; A. DC. in Prodr. XVI. ii. 99; Miq. Fl. Ind. Bat. I; 856 and Ann. Mus. Lugd.-Bat. I. 115; Wenzig in Jahrb. Bot. Gart. Berl. IV. 233; King in Ann. Calc. II. 28 t. 21A; Hook. f. Fl. Br. Ind. V. 603. *Cyclobalanopsis oidocarpa*, Oerst. in Kjoeb. Vidensk. Meddel. 78 (1866).

PENANG: at Batu Feringi, Vern. 'Brangen Babie', *Curtis* 434!. PERAK: in dense forest up to 250 m. alt., Larut, *King's Collector* 3723! 8258!; *Scortechini* (acorn only). DISTRIB: Sumatra *Korthals*, *Forbes* 585!; Borneo. Vern. 'Berangan Antan' *Ridley*.

3. *QUERCUS TURBINATA*, Blume Bijdr. 523 (1825), Fl. Jav. Cupul. 31, t. 18 and Mus. Bot.-Lugd.-Bat. I. 302; Miq. Fl. Ind. Bat. I. i, 855 and Ann. Mus. Lugd.-Bat. I. 114 (excl. syn. *Q. Horsfieldii*, Miq.); Koord. & Val. Bijdr. X. 22; Koord.-Exkurs. Fl. Jav. II. 60, fig. 10. *Q. lineata*, Bl. var. *Merkusii*, Wenzig in Jahrb. Bot. Gart. Berl. IV. 232 (excl. syn. *Q. Horsfieldii*; Miq.); King Ann. Calc. II. 33, t. 26. 2. *Q. Merkusii*, Endl. Gen. Pl. Suppl. IV. ii. 28. *Cyclobalanopsis Merkusii*, Oerst. in Kjoeb. Vidensk. Meddel. 79 (1866). *C. turbinata*, Schky in Engl. Bot. Jahrb. XLVII. 648 (1912).

Var. *crassilamellata*, Gamble. A large tree; branchlets stout, dark grey, rough. *Leaves* coriaceous; elliptic-oblong, shortly and obtusely acuminate at apex, attenuate at base; margins serrate; in the upper third or fourth part with about 4—5 pairs of serratures; glabrous or slightly puberulous on the lower surface, shining on the upper, dull on the lower surface and reddish-brown and slightly glaucescent when dry; 5—7 cm. long, 1.5—3 cm. broad; midrib moderately stout, slightly grooved on the upper, raised on the lower surface; main nerves 8—9 pairs, regular, subparallel, raised on both

surfaces; transverse nervules many, irregular and branched, reticulation obscure; petiole slender, 6—12 mm. long. *Spikes*: ♂ in dense short catkins, 1—2 cm. long, clustered in upper leaf-axils, densely villous: ♀ under 3 cm. long, very stout in fruit. *Flowers*: ♂ perianth 6-lobed, the lobes very small and thin, densely villous; stamens 6, anthers large, reniform, the connective penicillate; ♀ unknown. *Fruit* sessile, when very young truncate-obconic, the orifice showing only a short umbo tipped with the 3 divaricate styles; when nearly mature cupule slightly obconic at base for 5 mm. with about 2 belts, then cylindric for 1—1.5 cm. with about 4 belts, then flat with 2—3 belts, leaving an orifice 5—10 mm. in diam. from which only the umbo of the ovoid depressed shining slightly puberulous acorn protrudes, the acorn being 1 cm. in diam. and 7 mm. in height; the second and third lowest belts much thickened, corky, crenately-lobed, the upper belts entire.

PENANG: West Hill at about 750 m. alt., *Curtis* 903! PERAK: camp on Ulu Batang Padang, 1500 m. alt., *Wray* 1532!

This may prove to be a new species when better material becomes available, but in leaves and also in the acorns, except the two conspicuously thickened belts, it agrees well with Teysmann's specimens of *Q. Merkusii*, Endl., from Bangka Island. I quite agree with Koorders and Valetton that *Q. turbinata*, Bl., is distinct from *Q. lineata*, Bl. The description of the ♂ inflorescence and flower is taken from *Curtis* 903 which seems to, but does not certainly, belong to the same plant as *Wray*'s fruiting specimen. The leaves, however, agree quite well and the species belongs clearly to this genus.

2. PASANIA, Oerst.

Trees usually evergreen. *Leaves* usually entire, rarely serrate. *Flowers* monœcious or sometimes dicecious, often androgynous, in erect spikes, when androgynous the ♀ in the lower part the ♂ above, sometimes a few ♂ between, solitary or in clusters of 3 or more in ♂, of 3 at most in ♀, the clusters supported by minute bracteoles. *Perianth* cup-shaped, with usually 6, occasionally more lobes: ♂ larger than ♀, the latter surrounded by an involucre of many imbricate or annular scales. *Stamens* usually 12, rarely fewer or more; filaments very slender, erect; anthers very small, reniform or globose. *Ovary* in ♂ flowers a conspicuous villous pistillode; in ♀ flowers 3-celled, the cells 2-ovulate; styles 3, cylindric-subulate, spreading; stigma a terminal pore. *Acorn* ovoid globose or turbinate, seated on or enclosed except the umbo in a cupule; cupule with the scales imbricate or combined in lamellæ or reduced

to mere lines, sometimes tubercular or spinous; pericarp crustaceous coriaceous or woody, surmounted by an umbo consisting of the persistent styles, adherent to the cupule at the base or sometimes entirely. *Seed* 1, testa membranous, cotyledons fleshy, plano-convex or sinuous, sometimes indented star-like by protuberances of the endocarp.—*DISTRIB.* Chiefly of the Malay Peninsula and Archipelago and the Pacific Islands, about 100 species (Prantl).

Cupules with imbricate scales, their apices free, acorns much exsert (Sect. I. *EUPASANIA*).

Mature cupules shaggy with rather long (to 5 mm.) soft spreading scales.

Cupules thin, enclosing most of the acorn; acorn densely silky; leaves membranous, oblong-lanceolate or oblanceolate, caudate-acuminate, 10—25 cm. long, pubescent on midrib and nerves

1. *P. lappacea*.

Cupules thick, large, enclosing about two-thirds of the acorn; acorn large, tawny-velvety; leaves very coriaceous, ovate, obtusely acute, 6—12 cm. long, glabrous ..

2. *P. Kingiana*.

Cupules saucer-shaped, the margins incurved, enclosing only the base of the acorn; acorn cylindro-globular, depressed, 2.5 cm. in diam.; leaves coriaceous, oblong or elliptic, obtuse or acute, 10—20 cm. long, glabrous ..

3. *P. Scortechinii*.

Mature cupules with more or less adpressed, small, imbricate, acute or apiculate scales.

Cupules hemispheric, 12 mm. in diam.; acorns narrowly cylindric-conic, 2.5 cm. long, prominently umbonate; leaves thinly coriaceous, more or less oblong, acute, glabrescent except on the midrib and nerves ..

4. *P. Kunstleri*.

Cupules saucer-shaped, the scales imbricate.

Scales not at all arranged in rings; acorns glabrous, in conspicuous close spikes; leaves coriaceous.

Acorns ovoid-conic to depressed-globose; leaves variable, rather large, acuminate, 10—30 cm. long by 4—10 cm. broad, glabrous ..

5. *P. spicata*.

Acorns globose-conic; leaves elliptic-oblong, caudate-acuminate, very large, 20—40 cm. long by 6—18 cm. broad, glabrous ..

6. *P. grandifrons*.

Acorns ovoid-cylindric; leaves oblong, cuspidate-acuminate, 20

- 45 cm. long by 5—8 c.m. broad,
glabrous except midrib and nerves;
perulate scales conspicuous. .. 7. *P. Falconeri*.
- Scales more or less arranged in obscure
rings but distinct and apiculate; acorns
ovoid-conic.
- Acorns velvety; cupule-scales ad-
pressed, but their apices not spread-
ing or reflexed.
- Leaves elliptic, subcoriaceous,
shortly caudate-acuminate,
7—15 cm. long, main nerves
9—10 pairs not prominent .. 8 *P. Lamponga*.
- Leaves oblong-lanceolate or
-oblanceolate, coriaceous, cau-
date-acuminate, 12—20 cm.
long; main nerves 8—14 pairs,
prominent .. 9. *P. Wallichiana*.
- Acorns glabrous; cupule-scales ap-
pressed, but their apices spreading
or reflexed.
- Leaves thinly coriaceous, elliptic,
acute, pubescent at first, then
glabrous .. 10. *P. sundaica*.
- Leaves coriaceous, elliptic-ob-
long, cuspidate, densely to-
mentose .. 11. *P. Hystrix*.
- Cupules flat, only applied to base of acorn;
cupule-scales appressed with minute apices;
acorn ovoid, puberulous; leaves thinly cor-
iaceous, elliptic, long caudate-acuminate, .. 12. *P. Curtisi*.
- Cupules with the scales united in concentric entire or
denticulate lamellae; acorns much exsert (Sect II.
- CYCLOBALANUS).
- Cupules solitary or in pairs or threes, usually one
only developed.
- Acorn conspicuously longer than broad, ov-
oid-conical; cupule saucer-shaped, under
2.5 cm. in diam., the lamellae denticulate;
leaves obtusely caudate-acuminate.
- Acorn glabrous or silky-pubescent, sharp-
ly conical, usually 1.5 cm. high;
leaves coriaceous, usually elliptic-lan-
ceolate, stellate-tomentose beneath. .. 13. *P. conocarpa*.
- Acorn densely grey-sericeous-pubescent,
obtusely conical, usually 2 cm. high;
leaves chartaceous, elliptic-ovate, sil-
very-lepidote beneath .. 14. *P. Ewycii* var. *lati-
folia*.

Acorn not conspicuously longer than broad, hemispheric; cupule cup-shaped or saucer-shaped, under 2 cm. in diam., the lamellae hardly denticulate.

Cupule very thin saucer-shaped, the lamellae rather indistinct.

Acorn more or less ovoid, under 2 cm. in diam., glabrous; leaves thinly coriaceous, lanceolate, acute at base, silvery-lepidote beneath 14. *P. Ewyckii*.

Acorn broadly hemispheric, under 2.5 cm. in diam., glabrous; leaves chartaceous, elliptic, rounded at base, minutely stellate-pubescent beneath. 15. *P. cyrtorhyncha*.

Cupule moderately thick; leaves coriaceous.

Lamellae not very prominent, obscurely denticulate.

Acorn ovoid-conic, glabrous; leaves broadly elliptic, 7—12 cm. long, glabrous . . . 16. *P. Bennettii*.

Acorn depressed-hemispheric; leaves oblong-lanceolate or oblanceolate, 10—25 cm. long, lepidote-puberulous . . . 17. *P. Cantleyana*.

Lamellae prominent and thickened.

Acorn depressed-globose, over 2 cm. in diam.; leaves elliptic, 8—15 cm. long . . . 18. *P. Wenzigiana*.

Acorn ovoid-conic, scarcely 1.5 cm. in diam.; leaves lanceolate, 6—9 cm. long . . . 19. *P. Rassa*.

Acorn turbinate or depressed-hemispheric, conspicuously broader than long.

Cupule thin, its edges spread out free from the acorn; lamellae broad and flat; acorn sparsely sericeous, 3 cm. in diam.; leaves oblong, thinly coriaceous, minutely white-puberulous beneath, nerves very oblique, 15—30 cm. long . . . 20. *P. Eichleri*.

Cupule thick, its edges incurved and appressed to the acorn, lamellae more or less thickened.

Acorn under 2.5 cm. in diam.; leaves thinly coriaceous.

Lamellae few, about 5, broad; leaves oblong-lanceolate or

oblanceolate, long caudate-acuminate, 15—20 cm. long, 4—6 cm. broad .. 21. *P. Clementiana*.

Lamellæ many, about 8—10, the lower ones broad; leaves elliptic-oblong or oblanceolate, shortly obtusely acuminate, 5—13 cm. long, 2—4 cm. broad .. 22 *P. Omalokos*.

Acorn 3—4 cm. in diam.; leaves very coriaceous.

Lamellæ 8—13, thick and prominently annulate; acorn glabrous, hardly depressed; leaves oblanceolate, obtuse or emarginate, cuneate, 8—20 cm. long, glabrous beneath... 23. *P. lucida*.

Lamellæ about 10, rounded, indistinct and irregular, wavy; acorn tomentose, much depressed; leaves oblong, acuminate at apex and base, 15—30 cm. long, minutely tomentose beneath .. 24. *P. cyclophora*.

Lamellæ about 5, acute, more or less oblique; acorn very large, glabrous, much depressed; leaves elliptic-oblong or lanceolate, caudate-acuminate, 10—20 cm. long, glaucescent beneath .. 25. *P. costata*.

Cupules combined usually in threes, sometimes less, sometimes more, together, apparently several developed; leaves large, lanceolate, very coriaceous.. .. 26. *P. lampadaria*.

Cupules enveloping the whole acorn except the umbo, but not adnate to it except at base; with scales or tubercles or spines or merely ringed (Sect. III. CHLAMYDOBALANUS).

Cupules with appressed scales; leaves coriaceous, entire, more or less elliptic; acorns velvety.

Cupules always thin; acorns depressed-turbinate; main nerves of leaves 12—14 pairs .. 27. *P. Blumeana*.

Cupules thin when half ripe, thick tubercled when mature; acorns globose; main nerves 6—8 pairs .. 28. *P. confragosa*.

Cupules with spreading spines; leaves more or less lanceolate; acorns pubescent or silky.

- Cupules depressed, completely covered with rather soft spines which are hooked at the apex; leaves subcoriaceous, entire .. 29. *P. Wrayii*.
- Cupules more or less conical with numerous tufts or broken lines of sharp spines; leaves coriaceous, entire; ♂ spikes fairly stout, perianth-lobes nearly free .. 30. *P. discocarpa*.
- Cupules obliquely ovoid with oblique rings of sharp spines; leaves coriaceous, entire or serrate in the upper half; ♂ spikes almost filiform, perianth-lobes free .. 31. *P. acuminatissima*.
- Cupules smooth, with few faint rings or none.
- Cupules with faint rings, and obscure vertical lines between; leaves chartaceous, elliptic; fruit pedicels very thick .. 32. *P. encleisacarpa*.
- Cupules without rings but with vertical ribs; leaves coriaceous, lanceolate; fruits sessile 33. *P. Robinsonii*.
- Cupules enveloping the acorn except the umbo and adhering to it for some distance above the base; ringed or tubercled concentrically or obliquely (Sect. IV. LITHOCARPUS).
- Fruits pyriform; flattened and umbonate at top; cupule obscurely lamellate, completely enclosing the sericeous thin top of the pericarp; acorn separable only at the top; leaves coriaceous, oblong 34. *P. Maingayii*.
- Fruits ovoid or obovoid, narrowed towards the apex; cupule with 5—7 slightly prominent lamellae; leaves subcoriaceous, lanceolate .. 35 *P. Beccariana*.

1. PASANIA LAPPACEA, Oerst. in Kjoeb. Vidensk. Meddel. 84 (1866). A tree with spreading branches reaching 18—24 m. in height and about 60 cm. in diam. of stem; branchlets fairly stout, greyish, sparsely tomentose, young ones, young leaves and inflorescence thickly and villously fuscous-tomentose. *Leaves* membranous; oblong-lanceolate or oblanceolate, caudate-acuminate at apex, acutely attenuate sometimes unequally at base; margins entire; upper surface puberulous when young, afterwards glabrescent except the midrib and nerves, lower pubescent especially on the midrib and nerves; 10—25 cm. long, 4—8 cm. broad; midrib prominent, raised on both surfaces; main nerves 12—16 pairs, nearly parallel, usually impressed above, at first straight, then curved close to the margin to run parallel with it; transverse nervules many, subparallel, enclosing an areolate reticulation; petiole rather stout, pubescent, 5—7 mm. long. *Spikes* simple, solitary, axillary, slender, up to 20 cm. long, tawny-villous; ♂ most frequent and longest, and lowest, upper ones usually ♀, some partly ♂ partly

♀. *Flowers*: ♂ chiefly in clusters or sometimes solitary, bract 1 to each cluster; perianth 5—6-lobed, the lobes thin ovate, villous without glabrous within, 1—1.5 mm. long; stamens 9—12, with long slender filaments; pistillode villous: ♀ single or in clusters of 2—3, unibracteate; cup densely clothed with scales having long points that enlarge into soft spines; perianth lobes short, inconspicuous; styles 3, cylindric. *Fruits* clustered or solitary in spikes up to 15 cm. long; cupule velvety, sessile, flattened at base, ovoid above, 2—2.5 cm. in diam., 1—1.5 cm. in height, embracing nearly the whole acorn when young and one-half or more when ripe, covered with distant soft curved spines about 4 mm. long these spines being the free apices of the closely adherent scales; acorn ovoid-conic, about 2 cm. high, softly and densely silky, crowned by an umbo formed of the persistent styles. Schky in Engl. Bot. Jahrb. XLVII. 675. *Quercus lappacea*, Roxb. Fl. Ind. III. 637 (1832); Wight Ic. t. 220; Wall. Cat. 2780; A. DC. in Prodr XVI. ii. 87; Kurz For. Fl. II. 484; Wenzig in Jahrb. Bot. Gart. Berl. IV. 223; Hook. f. Fl. Br. Ind. V. 607; King Ann. Calc II. 41, t. 33; Brandis Ind. Trees 629. *Q. hirsuta*, Lindl. in Wall. Cat. 3734. *Q. Mackiana*, Hook. Ic. Pl. t. 224.

PERAK: in open forest near water at 90—120 m. alt. *King's Collector* 3919!; *Scortechini*!.—DISTRIB. India (Khasia Hills and Sylhet), Burma.

As pointed out by King the acorn-cups in Malay specimens more fully enclose the acorns than do those of Indian and Burmese specimens.

2. PASANIA KINGIANA, Gamble in Kew Bull. 177 (1914). A tree; branchlets stout, short, knotty, the bark dark brown, scaly, sparsely lenticellate; bud-scales short, ovate, obtuse, puberulous. *Leaves* very coriaceous, glabrous; ovate, obtusely acute at apex, rounded at base and then decurrent on the petiole; dark green when fresh, olive-brown when dry, the upper surface shining; margin recurved; 6—12 cm. long, 3—6 cm. broad; midrib stout, slightly raised and channelled near the base on the upper surface, prominent on the lower; main nerves 6—8 pairs, starting along the midrib at first then curved to the margin where they fade in diminishing loops; transverse nervules irregular, enclosing the prominently areolate reticulation; petiole stout, about 4 mm. long. *Spikes* 10—20 cm. long with stout angular puberulous rhachises, ♂ ♀ and androgynous mixed, the ♀ usually uppermost, axillary to the uppermost leaves. *Flowers* solitary, in androgynous spikes, the ♀

lowest, passing into a few ♀ then into ♂ only, all with lanceolate bracteoles 2 mm. long and cushions of imbricating tawny-pubescent triangular scales; perianth of ♂ cup-shaped, 2 mm. long, very villous, lobes 6, ovate-acute, 1 mm. long, that of ♀ similar but smaller; stamens 12 or less, filaments slender, short in ♀ flowers, anthers ovate; pistillode in ♂ villous; styles in ♀ cylindric, 2.5 mm. long, conspicuous. *Fruits* when young having cupules covered with spreading scales about 3 mm. long and minutely puberulous; when mature the cupules cup-shaped on a stout scaly pedicel 6 mm. long, 2—2.5 cm. long, the lips recurved, 2.5—3 cm. in diam. embracing about two-thirds of the acorn; scales near the base large, ovate, cuspidate-acuminate, spreading, often 5 mm. long, near the mouth the scales are smaller by degrees; acorn ovoid-globose from a flattened base, tawny-velvety, 2—2.7 cm. in diam., 1.5—2 cm. high; umbo thick.

PERAK: at Gunong Bubu, Larut, 1350 m. alt., *Wray* 3910!, at Gunong Inas. 1500 m. alt., *Wray* 4155!. PAHANG: at Gunong Brumbez, 2100 m. alt., *Wray* 1586!.

3. PASANIA SCORTECHINII, Schky in Engl. Bot. Jahrb. XLVII. 676 (1912). A large tree reaching 18—30 m. in height and 90 cm. in diam. of stem; branchlets stout, purplish-black, sparsely lenticellate. *Leaves* coriaceous; oblong or elliptic, obtuse or subacute at apex, cuneate at base; margins entire, reflexed; both surfaces glabrous, glossy green with a bluish tinge when fresh, reddish brown when dry, upper shining; 10—20 cm. long, 4—5 cm. broad; midrib slender, raised on both surfaces; main nerves 8—10 pairs, raised beneath, curving to and along the margin; transverse nervules few, irregular; reticulation areolate, obscure; petiole stout, wrinkled, 9—12 cm. long. *Spikes* in fruit erect, solitary, subterminal, very stout, about 10 cm. long. *Flowers* not known. *Fruit* very large, sessile; cupule woody, saucer-shaped, the margin incurved, 3 cm. in diam. 1 cm. high, covered thickly externally with soft conical pubescent scales, embracing only the base of the acorn; acorn cylindro-globular, shining, chestnut-brown, truncate at base, slightly depressed at top and crowned by an umbo formed of the persistent style 2.5 cm. in height and diam. *Quercus Scortechinii*, King in Hook. f. Fl. Br. Ind. V. 608 (1888) and Ann. Calc. II. 43, t. 35 A.

PERAK: in open forest on a hillside at about 1000 m. alt., Larut, *King's Collector* 2188!.

4. *PASANIA KUNSTLERI*, Gamble. A tree with spreading head and pendulous branches reaching 12—15 m. in height and about 60 cm. in diam. of stem; branchlets dark brown, smooth, the young ones paler and minutely tomentose. *Leaves* thinly coriaceous; elliptic- or oblanceolate-oblong, acute or shortly and often obtusely acute at apex, rounded or cordate at base; margins entire, reflexed; both surfaces minutely pubescent when young, glabrescent when old except on the midrib and nerves, which, especially the former, are puberulous on both sides, brown or reddish-brown when dry; 10—23 cm. long, 4—8 cm. broad; midrib moderately stout, keeled on the upper surface, prominent on the lower; main nerves 8—12 pairs, at first straight, sharply curved near the margin to join in loops, those of the upper half most prominently so, impressed above, prominent beneath; transverse nervules distant, rather obscure as is the areolate reticulation; petiole none or very short, under 5 mm. long, thick, pubescent. *Spikes* axillary and solitary or terminal, and in fascicles of 3—4, some ♂ only, some ♀, some occasionally both ♂ and ♀, 10—30 cm. long; rhachis slender, ridged, tawny pubescent. *Flowers*: ♂ solitary, many- (about 5-) bracteolate; perianth of 5—6 erect tomentose oblong acute lobes 1.5 mm. long; stamens 8—12, 3—5 mm. long with long filaments and minute globose anthers; pistillode thick, villous: ♀ (some ♀) also solitary, bracteolate; cup scaly, crowned by the 6-lobed erect perianth, shorter than in the ♂ and enclosing the thick pubescent style with 3 prominent diverging branches. *Fruit* solitary in long spikes; cupules subsessile, shallowly hemispheric, 12 mm. in diam., 7 mm. deep when young, embracing more than half the acorn, when old only the lower fifth; the scales broadly ovate, acute, keeled, closely appressed, fulvous-tomentose; acorn narrowly cylindric-conic, glabrous, up to 2.5 cm. long and 1.5 cm. in diam., crowned with a conspicuous umbo contracted below the persistent perianth and the remains of the style. *Quercus Kunstleri*, King in Hook f. Fl. Br. Ind. V. 606 (1888) and in Ann. Calc. II. 40, t. 31.

PERAK: in various places from sea level to about 300 m. alt., *King's Collector* 2482!, 2621!, 2742!, 2953!, 3054!, 3608!, 5128!, 5144!, 5358!, 5406!, 5436! 5556!, 5655!, 5699!, 7571!; *Wray* 3138!; at Larut, *Scortechini* 1567!. SELANGOR: at Kwala Lumpur, *Ridley* 5110!.

5. *PASANIA SPICATA*, Oerst. in Kjoeb. Vidensk. Meddel. 83 (1866). A large tree reaching 18—24 m. in height and 50—75 cm.

in diam. of stem; branchlets stout with dark grey or blackish bark, the lenticels conspicuous and usually in vertical lines, young shoots sometimes puberulous. *Leaves* coriaceous, shining, glabrous; elliptic-oblong or lanceolate or oblanceolate or obovate, sometimes panduriform, acuminate often obtusely at apex, the acumen usually curved sideways, attenuate at base, sometimes rounded or subauriculate; 10—30 cm. long, 4—10 cm. broad; midrib stout, prominent on both surfaces; main nerves 10—20 pairs, slender, subparallel, raised on both surfaces, arched near the margin; transverse nervules indistinct and irregular, enclosing the areolate reticulation; petiole short or long, 0.5—2.5 cm. long, flattened. *Spikes* erect, in terminal panicles or fascicles, usually dioecious, occasionally the ♂ spikes bearing a few ♀; often reaching 25—30 cm. long, minutely grey-tomentose. *Flowers*: ♂ in sessile clusters, crowded above, separate below, supported by an ovate acuminate or subulate bract 1—3 mm. long; sometimes bracteolate; perianth-lobes usually 6, very short, obtuse, villous without, glabrous within; stamens 10—12 with slender glabrous filaments and small ovate anthers; pistillode large, villous, often oblong, flattened at top: ♀ in clusters of 3—5 or distinct; perianth 6-lobed; styles very small. *Fruits* when ripe densely crowded on a stout erect woody rhachis, reaching 20 or more cm. in length, single or in clusters of 3—5; when single, bearing usually the abortive cupules at the base of the fertile one; cupule saucer-shaped, embracing at most the lower third of the acorn and sometimes less, the margin acute, the scales broadly ovate-apiculate, appressed, imbricate, pubescent when young, glabrous when old; acorn ovoid-conic to depressed-globose, smooth when ripe, the umbo very small. Schky. in Engl. Bot. Jahrb. XLVII. 664. *Quercus spicata*, Smith in Rees Enac. XXIX. 12; G. Don Prodr. Fl. Nep. 56; Wall. Pl. As. Rar. I. 40, t. 46 and Cat. 2781 A and B; Miq. Fl. Ind. Bat. I. i. 848 and Ann. Mus. Lugd.-Bat. I. 106; A. DC. in Prodr. XVI. ii. 85; Kurz For. Fl. II. 486; Brandis For. Fl. 489 and Ind. Trees 629; Hook. f. Fl. Br. Ind. V. 609; Wenzig in Jahrb. Bot. Gart. Berl. IV. 224; Oudem. Annot. Cupul. Jav. 5. 6, t. 1, 4 fig. 1; Koord. & Val. Bijdr. X. 39; King in Ann. Calc. II. 47, t. 41; Koord. Exkurs. Fl. Jav. II. 65. *Q. squamata*, Roxb. Fl. Ind. III. 638; Wight Ic. t. 213. *Q. grandifolia*, G. Don in Spreng. Syst. III. 856; Prodr. Fl. Nep. 57. *Q. Arcaula*, Ham. Ms. in Spreng. Syst. III. 857; Blume Mus. Bot. Lugd.-Bat. I. 290. *Q. elegans*, Blume in Bataav. Verh. IX. 208, Bijdr. 518 and Fl. Jav. Cupul. 21, t. 10; Oudem. Annot. Cupul. Jav. 5, 9, t. 2, 3. *Q. pyrifolia*, Blume Mus.

Bot. Lugd.-Bat. I. 304; Miq. Fl. Ind. Bat. I. 864. *Q. racemosa*, Jack in Mal. Misc. VII. 86; Korth. in Verh. Nat. Gesch. Bot. 205. *Q. glaberrima*, Bl. Verh. l.c. 210, t. 2, Bijdr. 519 and Fl. Jav. Cupul. 17 t. 18; Miq. Pl. Jungh. I. 10. *Q. depressa*, Bl. Verh. l.c. 209, t. 1. *Q. litoralis*, Bl. Mus. Bot. I. 303; Koord. & Val. Bijdr. X. 65. *Q. sphacelata*, Bl. Mus. Bot. I. 304; Koord. & Val. l.c. 65. *Q. placentaria*, Bl. Bijdr. 513; Fl. Jav. l. c. 19, t. 9.

DISTRIB. India, Burma, Malay Peninsula and Archipelago. Vern. 'Mempening Bungkus,' 'Berangan Padi' (Ridley).

Var. *gracilipes*, A. DC. Prodr. XVI. ii. 86. *Leaves* lanceolate or oblanceolate, gradually narrowed into the long petiole; cupule prominently scaly; acorn rounded and depressed at apex. Hook. f. Fl. Br. Ind. V. 610; King Ann. Calc. II. 48, t. 42—4; Koord. l.c. 66. *Q. gracilipes*, Miq. in Fl. Ind. Bat. Suppl. 347.

PROVINCE WELLESLEY: at Bukit Mutayaim, *Curtis* 2829!. PERAK: in dense forest up to 150 m. alt., Gopeng District, *King's Collector* 6085!, 6118!, 8228!; in Upper Perak at 300 m. alt., *Wray* 3772!; *Scortechini*!. MALACCA: *Maingay* K D 1456!. SINGAPORE: *Maingay* K.D. 1457!; at Bukit Timah, *Ridley* 4441!; at Sungei Udang, *Derry* 424!.—DISTRIB. India (Khasia Hills), Burma, Sumatra.

Var. *microcalyx*, A. DC. l.c. *Leaves* small; fruit small; cupules often solitary or subconnate; acorn with usually a conical apex. King in Ann. Calc. II. 48, t. 43 9—11. *Q. microcalyx* and *Q. anceps*, Korth in Verh. Nat. Gesch. Bot. 204 and 206; Oudem. Annot. Cupul. Jav. 6. t. 4 fig. 3; A. DC. l.c. 86. (excl. syn. *Q. turbinata*, Roxb. and *Q. Thomsoni*, Miq.). *Q. Arcaula*, Ham. var. *microcalyx*, Blume Mus. Bot. Lugd.-Bat. I. 290. *Q. Rhioensis*, Hance in Journ. Bot. (1878) 198.

PERAK: *King's Collector* 10947!.—DISTRIB. Rhio, Java, Sumatra.

6. PASANIA GRANDIFRONS, Gamble. A very large tree reaching a height of 18—30 m. and 60—90 cm. in diam. of stem, branches spreading; branchlets brown, smooth, grooved, minutely puberulous. *Leaves* very large, coriaceous; elliptic-oblong, abruptly caudate-acuminate at apex with an obtuse acumen, rounded or cordate, often unequally, at base; upper surface glossy green when fresh, brown and shining when dry, lower silvery grey when fresh, dull and pale when dry; 20—40 cm. long, 6—18 cm. broad; mid-

rib thick, deeply impressed but strongly keeled above, prominent beneath; main nerves 12—20 pairs, regular, parallel, the lowest 2—3 somewhat deflexed, the rest straight to near the margin where they curve to join in loops, raised on both surfaces; transverse nervules many, nearly straight and parallel, again joined by numerous close parallel nervules enclosing the areolate reticulation; petiole very stout, under 1 cm. long. *Spikes* mostly ♂, in slender, brown-hoary, terminal panicles 20 cm. or more long; bracts of the panicle-branches ovate, obtuse, auriculate, early caducous. *Flowers*: ♂ glomerulate in rather distant elongate clusters, gradually closer towards the top; cluster-bracts ovate-acute, 2 mm. long; flower bracteoles similar but smaller; flowers usually oblong; perianth-lobes 6, very short, obtuse, stellate-pubescent outside, nearly glabrous within; stamens 12, filaments slender, anthers globose; pistillode large, often oblong, very villous: ♀ solitary with short truncate styles. *Fruits* distant, in stout woody spikes up to 20 cm. long; pedicels very stout, hoary, about 5 mm. long, usually bilamellate, the lower without scales, the upper with a row of rather large ones: cupule when young with the edges incurved and embracing $\frac{2}{3}$ ths of the acorn, when ripe saucer-shaped, flat at base, very shallow (about 4 mm. deep), 2 cm. in diam., the edges not incurved, embracing only the base of the acorn; scales ovate-acuminate, pubescent, imbricate, closely appressed except the free sharp apices, when quite young in more or less annular series; acorns ovoid-conic when young, globose-conic with a flat base when adult, glabrous except slight pubescence round the umbo, shining, smooth, 2 cm. in diam., 15 mm. high, the umbo small. *Quercus grandifrons* King in Hook. f. Fl. Br. Ind. V. 610 (1888) and in Ann. Calc. II. 49, t. 83 B.

PENANG: at Penara Bukit, *Curtis* 3042!. PERAK: in dense forest in Larut up to 1000 m. alt. or more, *King's Collector* 3766!, 4867!, 4872!, 5365!, 6544!, 6604!, 7259!; *Scortechini*!; at Relan Tujor, *Wray* 2615!.

7. PASANIA FALCONERI, Schky in Engl. Bot. Jahrb. XLVII. 676 (1912). A small tree; branchlets stout, dark brown, shining, with prominent white lenticels; resting buds large, prominently sheathed in many pale lanceolate acuminate silky-puberulous scales reaching 2 cm. long and somewhat long persistent. *Leaves* thinly coriaceous; linear-oblong or oblong-lanceolate or -oblanceolate, acuminate often cuspidately at apex, acute or somewhat rounded at

base; upper surface green, brown when dry, shining, somewhat bullate, glabrous, lower yellowish when fresh, brown when dry, often puberulous along the midrib near the base otherwise glabrous; margins recurved when dry; 20—45 cm. long, 5—8 cm. broad; midrib stout, flattened and slightly raised on the upper, much raised on the lower, surface; main nerves 12—20 pairs, distant, impressed above, straight at first or slightly curved to near the margin and then prominently curved to join in loops; transverse nervules few, irregular, not prominent; reticulation minutely areolate but obscure; petiole very stout, 5—10 mm. long. *Spikes*: ♂ slender, erect, up to 15—20 cm. long from the axils of the perulate scales of the terminal shoots, which shoots elongate and are tawny-villous like the spike-rhachises; bracteoles ovate, acuminate, villous, 2—3 mm. long: ♀ slender, up to 20 cm. long; rhachis tawny-villous; bracteoles long lanceolate. *Flowers*: ♂ single or in clusters of few together at short intervals along the spikes; perianth-lobes 6, ovate, subacute, villous, 1.5 mm. long; stamens 12, with slender filaments and small globose anthers; pistillode rather small, circular, villous: ♀ solitary, scaly, imbricate, perianth-lobes shorter than in ♂, styles short, glabrous, spreading. *Fruits* in very long (often 40 cm.) spikes, the fertile mixed with many abortive, single or in pairs; rhachis stout, tawny-villous; pedicel 0 or under 2 mm. long; cupule in young fruits enclosing half the conical glabrous prominently umbonate acorn, when mature saucer-shaped closely velvety within and with the margins finally reflexed, 15—25 mm. in diam. and 5 mm. high embracing the base of the acorn, the scales ovate, acute, puberulous, reddish, closely appressed even to the apex; acorn ovoid-cylindric, glabrous, 20—25 mm. high and 17—22 mm. in diam.; umbo rounded, blunt, rather short, stigmas persistent. *Quercus Falconeri*, Kurz in Journ. As. Soc. Beng. II. 197 (1875), For. Fl. II. 485; Hook. f. Fl. Br. Ind. V. 608; King in Ann. Calc. II. 42 t. 34. *Quercus minor*, Ridl. in Journ. Str. Br. R. As. Soc. No. 57, 95 (1910).

KEDAH: Langkawi Island, *Curtis* 1677!, *Ridley* 9836!, 15494, 15791!; Alor Sta., *Ridley* 14960!. PERAK: in Upper Perak at about 90 m. alt., *Wray* 3410!, 3776!; at Temango, *Ridley* 14689!. DISTRIB. Tenasserim *Falconer* 458!, *Lace* 4768!.

8. PASANIA LAMPONGA, Gamble. A large tree reaching a height of 18—24 m. and 60—90 cm. in diam. of stem; branches spreading; branchlets fairly stout, dark-brown to black, smooth, marked by numerous very prominent pale lenticels, glabrous or the youngest

pulverulent. *Leaves* subcoriaceous; elliptic or elliptic-lanceolate, rarely oblong-lanceolate, shortly and rather abruptly caudate-acuminate at apex, acute at base; leaves when fresh bright green above silvery grey beneath, when dry olive-brown and somewhat shining and glabrous above, ashy-grey and dull and slightly pubescent beneath; 7—15 cm. long, 3—5 cm. broad; midrib slender, keeled above; main nerves 9—10 pairs, parallel, curved gently to and along the margin; transverse nervules rather scanty, subparallel, enclosing the areolate reticulation which is usually punctate on the upper surface; petiole 5—8 mm. long, channelled above. *Spikes* slender, ♂ or androgynous in many branched terminal panicles, up to 15 cm. long, the androgynous spikes few the ♀ flowers below; rachises minutely grey-pulverulent. *Flowers*: ♂ solitary or in groups of 2—4, rather distant; bracts ovate-acute, pubescent, 1—2 mm. long; perianth lobes 6, rounded, 1 mm. long, crisply villous without, nearly glabrous within; stamens 12 with long rather thick filaments and small reniform anthers; pistillode circular densely white-villous: ♀ single or in pairs; bracts as in ♂ also perianth-lobes but these are shorter; styles 3, conical, spreading, glabrous. *Fruits* in rather slender erect spikes about 7—8 cm. long, the rachises woody pubescent and lenticellate as the branchlets; pedicels none or up to 5 mm. long, stout, scaly; cupules when quite young covered with soft blunt scales and enclosing the acorn, when older the scales apiculate and about $\frac{1}{2}$ — $\frac{2}{3}$ of the acorn enclosed, when ripe the cups shallow, minutely sericeous, saucer-shaped with vertical sides, 16—18 mm. in diam. and 5—6 mm. deep embracing only the base of the acorn; scales broad, connate, with acute appressed apices, and arranged in faint but regular rings; acorns ovoid-conical, tawny-velvety, 15—18 mm. in diam. and nearly 2 cm. high; umbo sharp, under 1 mm. long. *Quercus Lamponga*, Miq. Fl. Ind. Bat. Suppl. 348 (1862); A. DC. Prodr. XVI. ii. 95; Miq. Ann. Mus. Lugd.-Bat. I. 109; Wenzig in Jahrb. Bot. Gart. Berl. IV. 229; Hook. f. Fl. Br. Ind. V. 611; King Ann. Calc. II. 53, t. 49. *Q. brevipetiolata*, Scheff. Observ. Phyt. II. 47. *Cyclobalanus Lamponga*, Oerst. in Kjoeb. Vidensk. Meddel. 81 (1866).

PROVINCE WELLESLEY: at Nibong Tebal, *Curtis* 3471!. PERAK: in dense forest up to 150 m. alt., Larut, *King's Collector* 3878!, 5413!, 6455!, 6479!, 6490!, 6578!, 6756!, 6901!, 7278!; Larut, *Scortechini* 1472!, etc.; at Lower Camp, Gunong Batu Putih, *Wray* 7468!; at Taipeng, *Wray* 2699! SINGAPORE: Pulau Ubin, *Ridley*

9479!; at Budit Timah Ridley 6442!.—DISTRIB. Sumatra (Lampongs, *Teysmann*), Bangka, Borneo, New Guinea.

Var. *Ewyckiioides*, Gamble. Branchlets paler. Leaves smaller, rarely over 10 cm. long and 4 cm. broad, the bases more acuminate, more silvery beneath, main nerves closer and more numerous. Spikes more slender, the bracts of the flowers longer and more conspicuous. Fruits with the cups more lamellate and the points of the scales less prominent though present.

PERAK: in dense forest up to 300 m. alt., *King's Collector* 4449!, 6503!, 7777!, 10884!; at Assan Numlong, *Wray* 2570!. SELANGOR: Pahang track, *Ridley* 8502!; at Kwala Lumpur, *Ridley's Collector* 5011!. MALACCA: at Brisu, *Derry* 400!. SINGAPORE: at Seeleetah, *G. King*!; in garden jungle, *Ridley* 1606!, 4003!; at Chan Chu Kang, *Ridley* 3387!; *Hullett* 119!.

This is the form which King has called, on the sheets of the Calcutta Herbarium, "*Q. Lamponga*, Miq. passing into *Q. Ewyckii*, Korth." In leaves it resembles *Q. Ewyckii* more than *Q. Lamponga* but the conical velvety acorns are those of *Q. Lamponga* and the scales of the acorn-cups though rather more prominently lamellate, yet show clearly that they are connate and apiculate so that I consider it to be more nearly allied to the latter species.

9. PASANIA WALLICHIANA, Gamble. A large tree reaching a height of 12—18 m. and 40—60 cm. in diam. of stem; branches spreading; branchlets stout, pale brown or greyish-brown, minutely lenticellate, puberulous, the youngest cinereous-tomentose; bud-scales ovate, acute, tomentose. Leaves coriaceous; oblong-lanceolate or -oblanceolate, abruptly caudate-acuminate at apex, acuminate at base; upper surface glossy green when fresh, brown and shining when dry, glabrous except the midrib, lower silvery grey, glabrous or puberulous; 12—20 cm. long, 3—8 cm. broad; midrib rather slender, prominent, raised and pubescent on both surfaces; main nerves 8—14 pairs, prominent beneath, at first parallel and straight, curved close to the margin and joining in loops; transverse nervules irregular, enclosing the rather obscure reticulation; petiole 8—12 mm. long. Spikes solitary, and axillary or in small terminal panicles, up to about 20 cm. long, ♂ only or androgynous, the ♂ above, the ♀ below. Flowers: ♂ loosely glomerulate in oblong sessile patches; bracts subulate, 1—2 mm. long; perianth-lobes 6, very short, obtuse, villous without; stamens 12 with slender filaments and small globose anthers; pistillode large, round or oblong, villous: ♀ in rather distant clusters of 3—5; perianth inconspicuous; styles 3, conical, divergent. Fruits crowded in stout spikes

about 10—13 cm. long; pedicels thick, very short, woody; cupules when young cup-shaped, enclosing three-fourths of the acorn, then gradually opening out and when mature saucer-shaped, about 15 mm. in diam. and 3—4 mm. deep, embracing only the bases of the acorns, hoary puberulous; scales broad, appressed in obscure rings only the sharp minute apices free; acorns hemispheric, tawny-velvety, the apices conical, 15 mm. in diam., 10 mm. high; umbo apiculate with the remains of the stigmas. *Quercus Wallichiana*, Lindl., in Wall. Cat. 2778 (1831); Hance in Seem. Journ. Bot. VIII. 4; Trim. Journ. Bot. (1874) 241; Hook. f. Fl. Br. Ind. V. 610; King Ann. Calc. II. 51, t. 46.

PENANG: *Wallich* 2778!; *King*!; *Stoliczka*!; on Government hill at 300 m. alt., *Curtis* 120!, 253!, 365!; at about 300—600 m. alt., *King's Collector* 1515!, 1573!, 1795!, 2279!, 5199!. PERAK: in open forest, Larut, to 450 m. alt., *King's Collector* 4853!, 5195!; top of low hills, Ulu Bubong, *King's Collector* 10832!. SELANGOR: Pahang track, *Ridley* 8502!. MALACCA: *Griffith* K.D. 4467; *Main-gay* K.D. 1460—2!, 1532!; at Sungei Hudang, *Goodenough* 1362!. SINGAPORE: at Selitar, *Ridley* 5113!, 5114!; at Pulau Ubin, *Ridley* 9479!; at Turong, *Ridley* 3384!

10. PASANIA SUNDAICA, Oerst. Kjoeb. Vidensk. Meddel. 83 (1866). A large tree reaching 12—18 and even 30 m. in height and 60—90 cm. in diam. of stem; branches spreading; branchlets stout, greyish-brown, the young ones minutely fulvous-tomentose; bud-scales ovate, acute, very tomentose. *Leaves* thinly coriaceous; elliptic or elliptic-oblong or elliptic-subobovate, acute or shortly and obtusely acuminate at apex, attenuate or more or less rounded at base; dark green above when fresh, brown and dull when dry, furfuraceously pubescent especially on the nerves and midrib, then glabrous, silvery grey beneath when fresh, greyish-brown when dry and hoary-tomentose, glabrescent later on; 10—20 cm long, 5—10 cm. broad; midrib prominent, raised and tomentose on both surfaces; main nerves 10—15 pairs, parallel, the lowest 2—3 pairs rather near the base, nearly straight to the margin where they curve abruptly to join in diminishing loops, raised on both surfaces and pubescent; transverse nervules subparallel, slightly arched; reticulation obscure; petiole stout, 5—7 mm. long. *Spikes* in large much branched spreading terminal panicles, up to 20 cm. long, ♂ much more numerous than ♀, sometimes androgynous, ♂ above ♀ below; rachises densely furfuraceously

fulvous or ashy tomentose; bracts ovate lanceolate very caducous. *Flowers*: ♂ solitary or in rather loose clusters; bracts ovate-subulate about 1 mm. long; perianth-lobes 6, short (under 1 mm. long), ovate, obtuse or slightly acute, spreading, villous without; stamens 12 or more, with slender filaments and very small globose anthers; pistillode large, round, very villous: ♀ solitary or in groups of 2—4; bracts as in ♂; perianth-lobes ovate shorter than in ♂, pedicel and base covered with subulate blunt often reflexed scales; styles 3, conical, divergent. *Fruits* in stout erect spikes 10—15 cm. long, single or rarely in groups of 2—4; pedicels stout, about 4 mm. long, scaly; cupules saucer-shaped, flat, the margins incurved when immature at first quite embracing the acorn, later half embracing it, erect when ripe, 15—23 mm. in diam., 2—3 mm. deep and so embracing only the base of the acorn; scales broadly ovate, connate, tawny-pubescent, sometimes more or less in rings, the apices sharp, spreading or even deflexed; acorn globose-conic or ovoid-conic, glabrous, the base truncate when ripe, 2 cm. high and 2.5 cm. in diam.; umbó prominent, sharp, often 2—3 mm. long, with the remains of the styles. Schky in Engl. Bot. Jahrb. XLVII. 675. *Quercus sundaica*, Blume Verh. Bat. Genootsch. IX. 216 (1825), Bijdr. 520, Fl. Jav. Cupul. 11, t. 2—3 and Mus. Bot.-Lugd.-Bat. I. 292; Miq. Fl. Ind. Bat. I. i. 850 and Ann. Mus. Lugd.-Bat. I. 109; A. DC. Prodr. XVI. ii. 89; Oudem. Annot. Cupul. Jav. 11; Hook. f. Fl. Br. Ind. V. 611; King Ann. Calc. II. 51, tt. 47, 48; Koord. & Val. Bijdr. XI. 31; Koord. Exkurs. Fl. Jav. II. 63. *Q. mappacea*, Korth. Verh. Nat. Gesch. 202; Miq. Fl. Ind. Bat. I. i. 850. *Q. Korthalsii*, var. *mappacea*, Blume Mus. Bot. I. 293; A. DC. l.c. 90. *Q. pseudomolucca*, Bl. vars. *Korthalsii* and *sundaica*, Wenzig in Jahrb. Bot. Gart. Berl. I 227. *Q. muricata*, Roxb. Fl. Ind. III. 635.

PENANG: *Maingay* K.D. 1530!; on Penang hill *G. King*!; Government Hill, Vern. 'Brangen Babie' *Curtis* 442!; at elevations of from 300 to 750 m., *King's Collector* 1622!, 1627!, 1692!, 1780!, 2264!, 2274!, 2282!, 2284!, 4837!, 4840!; at Bellevue, *Ridley* 10784!. PERAK: in forest up to about 750 m., *Larut, King's Collector* 2232!, 3272!, 3341!, 3502!, 3681!, 3866!, 3944! 4870! 4944!, 5543! 6583! 7013!, 7241!, 7254!, 7371!; at Thaipeng, *Wray* 3103!; *Scortechini*!. MALACCA: at Hulu Chemliong, *Derry* 1131!; at Ayer Panas, *Ridley* 1113! (doubtful). JOHORE: at Kwalla Sembrong, *Lake and Kelsall* 4014!.—DISTRIB. Java, Sumatra (*Forbes* 2933!, 3144!). Borneo. Vern. 'Mempening Bagan' (*Ridley*).

11. *PASANIA HYSTRIX*, Gamble. A large tree reaching a height of 18—24 m. and 60—90 cm. in diam of stem; branches spreading; branchlets densely fulvous-tomentose; bud-scales broadly ovate, acute, somewhat persistent. *Leaves* coriaceous; elliptic or elliptic-oblong, acute or shortly cuspidate at apex, acute at base; upper surface deep green when fresh, olive-brown when dry, furfuraceous-pubescent especially on the nerves, when old nearly glabrous and shining, lower pale also furfuraceous-pubescent, the hairs on both sides often stellate; margin recurved; 10—22 cm. long, 4—8 cm. broad; midrib stout, raised on both surfaces and densely tomentose; main nerves 12 to 16 pairs, parallel, slightly curved to close to the margin and then suddenly bending along it and meeting in diminishing loops; transverse nervules many, arched, prominent beneath; reticulation obscure; petiole stout, 6—7 mm. long. *Spikes*: ♂ in terminal panicles densely fulvous-tomentose, reaching 15 cm. in length; ♀ solitary, axillary, up to 10 cm. long; bracts short, ovate acuminate, early caducous. *Flowers*: ♂ solitary or in clusters, the bracteoles lanceolate; perianth 1 mm. long, the 6 lobes obtuse; stamens 12 with slender exert filaments and small reniform anthers; pistillode cushion-like, circular, very villous: ♀ solitary with a lanceolate bracteole as in ♂ densely covered with short usually spreading or reflexed conical scales; perianth as in ♂ but smaller; styles 3, conical, small. *Fruits* in stout spikes up to 12 cm. long, solitary or rarely with 1 or 2 abortive at the base; pedicel thick, obconic, flattened, 5 mm. long; cupule when young nearly enclosing the acorn, funnel-shaped, the margins incurved, the scales long, soft, spreading or reflexed, when ripe saucer-shaped embracing only the base of the acorn, 2 cm. in diam. and 5 mm. high, the margin only slightly incurved, the scales ovate, sharp, fulvous-tomentose, connate, the apices erect or recurved, rings rather obscure; acorn conico-hemispheric, with truncate base, glabrous when ripe, about 1 cm. high without the very prominent cylindric umbo. *P. Korthalsii*, Oerst. in Kjoeb. Vidensk. Meddel. 83 (1866). *Quercus Hystrix*, Korth. Verh. Nat. Gesch. Bot. 201 t. 43 (1839—1842); Wenzig in Jahrb. Bot. Gart. Berl. IV. 223; Hook. f. Fl. Br. Ind. V. 611; King Ann. Calc. II. 54, t. 50. *Q. Korthalsii*, Blume var. *Hystrix*, Bl. in Mus. Bot. Lugd.-Bat. i. 293; A. DC. Prodr. XVI. ii. 90; Oudem. Annot. Cupul. Jav. 11. *Castanea* ? *furfurella*, Miq. Fl. Ind. Bat. Suppl. 352; Ann Mus. Lugd.-Bat. I. 108. *Cyclobalanus Hystrix*, Oerst. in Kjoeb. Vidensk. Meddel. 81 (1866).

PERAK: in open forest at Ulu Bulong, etc., up to 250 m. alt., *King's Collector* 7865!, 10636!; *Scortechini*!. MALACCA: *Griffith* K.D. 4473!; *Maingay* K.D. 1458!; at Bukit Bruang, *Curtis* 3645! at Sungei Hudang and Hulu Chembrong, *Derry* 1124!, 1131!; at Selandan and Ayer Panas *Ridley* 10765!, 10789!. SINGAPORE: *G. King*!; *King's Collector* 1253!; at Toas, *Ridley* 3383!.—DISTRIB. Sumatra. Vern. 'Mempening or Kampuning.'

Var. *longispica*, Gamble. *Spikes* (in young fruit only) up to 20 cm. long with the fruits in threes or rarely solitary; cupule scales in rings, soft, fulvous-tomentose, appressed.

PERAK: *Scortechini* (without number or locality).

I have thought it best to make this a variety, the leaves are like those of *P. Hystrix* though rather more prominently nerved, but the young fruits differ a good deal. When it is better known, it may prove to be a distinct species.

12. *PASANIA CURTISII*, Gamble. A tree reaching 9—12 m. in height and 60 cm. or more in diam. of stem; branches spreading; branchlets pale brown, glabrous, with shining smooth bark and many prominent lenticels. *Leaves* thinly coriaceous; elliptic-oblong or -ovate or -lanceolate, obtusely long caudate-acuminate at apex, acuminate at base; glossy bright green above, pale silvery below when fresh, both surfaces pale live-brown when dry and glabrous; margins slightly recurved; 12—25 cm. long, 5—8 cm. broad; midrib prominent, raised on both surfaces; main nerves 9—10 pairs, distant, slender, obliquely curving to and along the margin where they almost disappear, inconspicuous above, prominent beneath; transverse nervules few, irregular, enclosing the obscure areolate reticulation; petiole stout, 4—6 mm. long. *Spikes* numerous, very long (up to 20 cm.) and slender in clusters some single some in panicles from the upper axils of the leaves, ♂ most numerous, but ♀ frequent, occasional spikes androgynous; rachises grey-puberulous, angular. *Flowers*: ♂ solitary or sometimes few together on the angles of the rachis; bracteoles small, ovate, pubescent; perianth lobes 6, ovate, spreading, ciliate, about 1 mm. long; stamens 12 with slender filaments and small globose anthers; pistilode cushion-like, white-villous, rather small and circular: ♀ (some ♂) solitary, bracteole as in ♂, base with imbricate rounded scales perianth-lobes as in ♂ and rather prominent; styles 3—4, long, subulate, glabrous; stamens in ♀ flowers very small perhaps without fertile pollen. *Fruits* crowded and touching but not connate, in

long-peduncled spikes up to about 10—12 cm. long, the rhachises woody, but not very stout; pedicel none; cupules in quite young fruit cup-shaped and embracing half the acorn, later on quite flat and thin, 18 mm. in diameter, applied to the base of the acorn; scales closely connate, imbricate, appressed, only the minute apices free; acorn when young flattened hemispheric-conical, when old ovoid, puberulous, 2 cm. high and as much in diam.; umbo conspicuous. *Quercus Curtisii*, King in Hook. f. Fl. Br. Ind. V. 612 (1888) and in Ann. Calc. II. 56, t. 52.

PENANG: at Waterfall, *G. King*, August 1879!; *Curtis* 1253!; in forest up to 240 m. alt., *King's Collector*, 4833!, 4836! 4832! 4854!. PERAK: at Larut up to 300 m. alt., *King's Collector* 3304!, 4902!, 10678!. SELANGOR: at Rawang, *Ridley* 12062!.

13. PASANIA CONOCARPA, Schky in Engl. Bot. Jahrb. XLIX 357 (1913). A large tree reaching 18—24 m. in height and 60—90 cm. in diam. of stem; branches spreading; branchlets stout with light brown bark, the youngest and young leaves densely covered with minute rufous stellate tomentum; resting buds ovoid, grey-tomentose, their scales lanceolate, 5 mm. long, deciduous. *Leaves* coriaceous; elliptic-oblong or -lanceolate, abruptly caudate-acuminate at apex for about 1 cm. the tip obtuse, acute at base; upper surface at first minutely stellate-puberulous, afterwards glabrous and shining, the midrib tomentose, lower surface stellate-tomentose, grey or pale brown; margins sometimes undulate; 7—15 cm. long, 3—6 cm. broad; midrib raised on both surfaces; main nerves 10—14 pairs, prominent beneath, slightly curving to join in arches near the margin; transverse nervules prominent, irregular and branching; reticulation obscure; petiole 3—8 mm. long, tomentose. *Spikes*: ♂ solitary and axillary, with prominent bracts, rather short, sometimes the ♂ flowers ending the ♀ spikes: ♀ in terminal panicles up to 15 cm. long, all greyish stellate-tomentose. *Flowers*: ♂ in fascicles of 1—3, sessile, bracteole lanceolate 1—2 mm. long; perianth-lobes very short, obtuse, subglabrous within; stamens 12, with slender filaments and small globose anthers; pistillode rather small, circular, densely villous: ♀ solitary, bracteole as in ♂, base cylindric, styles 3, spreading. *Fruits* when ripe touching and mixed with many undeveloped ones; in spikes with a woody rhachis up to 10 cm. long; cupules puberulous, when young obovoid nearly completely embracing the young acorn, the lamellae few but prominent and denticulate, when ripe embracing only the base of

the acorn, saucer-shaped, 15—18 mm. in diam., 5—6 mm. deep, with 5—6 denticulate lamellae; acorn glabrous or silky-pubescent, ovoid-conical with truncate base, 15—20 mm. high and about 18 mm. in diam.; umbo very prominent, long and sharply tipped with the persistent styles. *Quercus conocarpa*, Oudem. in Versl. en Mededeel. XII. 206 (1868) and Annot. Cupul. Jav. 18, t. 10 (1863). Miq. in Ann. Mus. Lugd.-Bat. I. 113; A. DC. in Prodr. XVI. ii. 93; Wenzig in Jahrb. Bot. Gart. Berl. IV. 230; Hook f. Fl. Br. Ind. V. 612; King Ann. Calc. II. 61, t. 56 A; Koord. & Val. Bijdr. X. 50; Koord. Exkurs. Fl. Jav. II. 68. *Cyclobalanus conocarpa*, Oerst. Kjoeb. Vidensk. Meddel. 81. (1866).

PERAK: at Goping and Ulu Bubong, in open forest up to 250 m. alt., *King's Collector* 821!, 5816!, 58146!, 10519!; *Scortechini*!. SINGAPORE: *Caniley* 182; *King's Collector* 1249!; at Selitar, Changi and Chanchukang, *Ridley* 5115!, 5116!, 5118!, 5989!; *Hullett* 622!. —DISTRIB. Java, Sumatra, Borneo.

The Perak, Singapore and Bornean specimens differ from Oudemans' type from Java in having the leaves more abruptly caudate-acuminate and the acorns glabrous, otherwise they agree as King has pointed out. King's identifications have been confirmed apparently by Koorders, but I cannot help feeling that better specimens from Java might show that the Peninsular and Bornean tree is at least a well-marked variety.

14. PASANIA EWYCKII, Gamble. A large tree reaching a height of 18—24 m. and a diam. of stem of 70—100 cm.; branches spreading; branchlets rather stout, brown, with scattered white lenticels, the youngest more slender lepidote-puberulous; resting buds small, scales linear-lanceolate. *Leaves* thinly coriaceous; lanceolate or oblong-lanceolate, long caudate-acuminate at apex, acute at base; upper surface when young slightly lepidote afterwards glabrous, lower silvery-grey-lepidote-pubescent; margins entire or sometimes undulate; 10—15 cm. long, 4—6 cm. broad; midrib stout, raised on both surfaces; main nerves 11—14 pairs, slightly raised above, parallel, at first nearly straight, curving near the margin to join in diminishing loops; transverse nervules many, oblique, nearly straight, parallel, enclosing the minutely areolate reticulation; petiole 7—11 mm. long, partly bordered by the decurrent margins of the blade. *Spikes*: ♂ up to 10 cm. long, in few-branched, rather contracted terminal panicles; rhachis angular, lepidote-puberulous; bracteoles ovate acute, 1 mm. long; ♀ solitary, at the base of the ♂ panicle. *Flowers*: ♂ solitary or in clusters of 3—4; perianth subcylindric, pubescent, 1—1.5 mm. long, lobes 6 very short; stamens

12, filaments slender, anthers ovate, small, minutely apiculate; pistil-lode large, very villous, whitish when dry. *Fruits* in spikes up to 25 cm. long with a stout rhachis; pedicel much thickened, 0—7 mm. long, annulate; cupules very thin, when young enclosing nearly the whole acorn, when mature saucer-shaped embracing only the lower third of the acorn, minutely grey-tomentose, 2—2.5 cm. in diam., 5—6 mm. deep; lamellae about 7—10, fairly distinct, usually entire; acorn hemispheric or ovoid-conic about 2 cm. in diam. and 1.5 cm. high, truncate and intruded at base, glabrous except close under the umbo which is sharp and conical. *Quercus Ewyckii*, Korth. in Verh. Nat. Gesch. Bot. 212, t. 46 (1839-42). Bl. in Mus. Bot. Lugd.-Bat. I. 300; A. DC. Prodr. XVI. ii. 94; Wenzig in Jahrb. Bot. Gart. Berl. IV. 230; King Ann. Calc. II. 68, t. 62 A. *Cyclobalanus Ewyckii*, Oerst. in Kjoeb. Vidensk. Meddel. XLVII. 80.

PERAK: in open forest on low hills at 150—250 m. alt. *King's Collector* 7846!. SINGAPORE: at Bukit Timah, *Goodenough* 396!. —DISTRIB. Sumatra (*Korthals*!).

Var. *latifolia*, King in Ann. Calc. II. 68, t. 62 B. *Leaves* chartaceous, elliptic ovate, more shortly and obtusely caudate acuminate, transverse nervules not quite so close or so straight; cupules thicker, the lamellae denticulate; acorn longer, up to 2 cm., densely grey-sericeous-pubescent. Hook. f. Fl. Br. Ind. V. 614 (acorn described as glabrous).

PERAK: in open forest in rocky places near Thaipeng up to 250 m. alt., *King's Collector* 8532!. SINGAPORE: at Bukit Timah, *Ridley* 5117!

When in leaf only this species can easily be mistaken for *P. Lamponga*.

15. PASANIA CYRTORHYNCHA, Gamble. A large tree reaching a height of 18—24 m. and 60—90 cm. in diam. of stem; branches spreading; branchlets stout, with smooth shining pale grey bark and scattered lenticels, innovations scaly, grey-puberulous as also the inflorescence, youngest leaves blackish when dry as are the buds and bud-scales. *Leaves* chartaceous; elliptic or elliptic-oblong, abruptly shortly (under 1 cm.) obtusely caudate-acuminate at apex, rounded or sometimes cuneate at base; upper surface glabrous, not shining, reddish-brown when dry, lower pale and covered especially when young with very minute grey stellate pubescence; margin entire; 12—22 cm. long 6—10 cm. broad; midrib stout, raised on both surfaces; main nerves 10—15 pairs, slightly curved to about

1 cm. from the margin and then joined by somewhat angular often gradually diminishing loops; transverse nervules prominent, rather irregular, enclosing the areolate rather obscure reticulation; petiole about 5 mm. long; stipules linear, about 5 mm. long, caducous. *Spikes*: ♂ up to about 15 cm. long, in large spreading grey-puberulous terminal panicles; rhachises slender, angular; bracteoles linear-lanceolate, 1.5 mm. long; ♀ solitary, axillary. *Flowers*: ♂ solitary or in clusters of 2—4, the lower distant, the upper close; perianth cup-shaped, 1 mm. long, sub-glabrous within, lobes 6, ovate acute; stamens 12, filaments slender, recurved or spirally twisted, anthers slightly oblong; pistillode densely villous, nearly white when dry, circular or oblong in outline. *Fruits* solitary, sessile, in stout spikes up to 15 cm. long; rhachises very stout, pale grey like the branchlets; cupules when young campanulate, when mature very thin, saucer-shaped, embracing the lower half of the acorn, about 23 mm. in diam., 6—7 mm. deep; lamellæ 6—7, rather thin and indistinct, the margins undulate with very obscure minute teeth; acorn broadly hemispheric, truncate and intruded at base, chestnut-brown, shining and smooth, glabrous except just under the umbo, diam. as the cupule, height with the umbo 17 mm.; umbo small, conical. *Quercus cyrtorhyncha*, Miq. Fl. Ind. Bat. Suppl. 350 (1862); A. DC. Prodr. XVI. ii. 105; Hook. f. Fl. Br. Ind. V 613; King Ann. Calc. II. 66, t. 60 B.

PERAK: in various localities at from 150 to 900 m. alt., *King's Collector* 4898!, 5820!, 7117!, 10809!, 10944!. SELANGOR: at Gint-ing Bidai, *Ridley* 7615!.—DISTRIB. Sumatra, Borneo.

16. *PASANIA BENNETTII*, Gamble. A tree; branchlets moderately stout to slender, the bark dark brown, innovations glabrous as are all parts except the inflorescence. *Leaves* coriaceous; broadly elliptic, abruptly obtusely cuspidate at apex, acuminate narrowed at base; upper surface dull, smooth, lower whitish when fresh greyish-brown when dry; 7—12 cm. long, 3—7 cm. broad; midrib stout and broad, raised above; main nerves 18—12 pairs, curved to near the margin and then joining in loops, faint on both surfaces; transverse nervules many, fairly regular and parallel, slightly arched, more numerous near the midrib; reticulation obscure; petiole slender, up to 1 cm. long, bordered almost to the base by the decurrent margins of the blade. *Spikes*: ♂ up to about 9 cm. long, in axillary or subterminal panicles of several branches, the rhachises angular, grey-puberulous; ♀ solitary or very few in axillary or

subterminal panicles, rhachises as in ♂. *Flowers*: ♂ solitary; bracteole ovate, scarcely .5 mm. long; perianth 1—1.5 mm. long, tube cup-shaped, lobes 6, short, obtuse, slightly puberulous without; stamens 12, filaments slender, anthers globose, very small; pistillode large, densely villous: ♀ solitary; bracteole as in ♂, cupule annular, styles short, erect. *Fruits* when ripe nearly touching and mixed with many undeveloped ones, in spikes with a stout woody rhachis up to about 7 cm. long; cupules puberulous, when young subcylindric with about 5 lamellæ and nearly completely enclosing the acorn, when ripe very shortly thickly pedicelled, saucer-shaped, about 1 cm. high and 2 cm. in diam., embracing only the base of the acorn; lamellæ distinct, the teeth of the scales also distinct though minute; acorn glabrous, ovoid-conic, 2 cm. in diam., 1.5 cm. high, base deeply intruded, umbo short. *Quercus Bennettii*, Miq. Fl. Ind. Bat. I. i. 857 (1855), Suppl. 348 (1862), and Ann. Mus. Lugd.-Bat. I. 112; A. DC. Prodr. XVI. ii. 94; Wenzig in Jahrb. Bot. Gart. Berl. IV. 235; Hook. f. Fl. Br. Ind. V. 612; King Ann. Calc. II. 64, t. 58 A. *Q. Miqueliana*, Scheff. Obs. Phyt. II. 48, III. 94.

PERAK: at Gunong Inas at 1500 m. alt., *Wray* 4095!, 4105!, 4126!. PAHANG: at Kluang Terbang, *Barnes* 10910!. JOHORE: at Tanjong Kupang, Hadji Senawi, etc., *Ridley* 6446!, 11060!, 12515!. SINGAPORE: *Maingay* K.D. 1460!; at Selitar, etc., *Ridley* 3960!, 6439!.—DISTRIB. Bangka (*Teysmann*, *Kurz*), Sumatra (*Teysmann*), Borneo (*Beccari*).

17. *PASANIA CANTLEYANA*, Gamble. A large tree reaching 24—30 m. in height and 60—90 cm. in diam. of stem, branches spreading; branchlets stout, angular, minutely lepidote-puberulous or glabrous, bark greyish-brown, smooth with prominent lenticels grouped at the bases of the fruit-spikes or in longitudinal patches on the internodes; bud-scales ovate, falcate, deciduous. *Leaves* rigidly coriaceous; oblong-lanceolate or oblanceolate, cuspidate-acuminate, often rather abruptly, at apex, attenuate and somewhat decurrent at base; upper surface very minutely lepidote-puberulous or glabrous, glossy-green when fresh, shining, olive brown when dry, lower surface more densely lepidote-puberulous, silvery grey when fresh, pale brown when dry; margins entire; 10—25 cm. long, 4—8 cm. broad; midrib stout, prominent and raised on both surfaces; main nerves 12—15 pairs, parallel, prominent on the lower surface, at first straight or only slightly curved, then

sharply curved close to the margin; transverse nervules many and nearly regular and parallel, enclosing the very minutely areolate reticulation; petiole stout at base, 15–20 mm. long, the upper half bordered by the decurrent margins of the blade. *Spikes*: ♂ solitary, axillary, reaching 15–20 cm. long; rhachises angular, grey-lepidote; bracteoles lanceolate, acuminate, 1–3 mm. long, prominent, especially on the lower part of the rhachis below the flowers: ♀ also solitary, axillary, up to 25 cm. long; rhachis stout, angular; bracteoles as in ♂. *Flowers*: ♂ solitary or subglomerulate; perianth cup-shaped, 1–1.5 mm. long, lobes 6, shallow, obtuse, villous within; stamens 12, filaments slender, anthers small, globose; pistillode cylindric, densely villous: ♀ in groups of 2–3 or sometimes solitary, on stout pedicels, soon reaching 5 mm. long and decurrent at their bases both above and below to the rhachis, young cups prominently scaly styles; 3, small. *Fruits* single or sometimes in pairs on a very stout woody pedicel along the thick rhachis of a woody raceme, when single the undeveloped ones remaining at the base; pedicel about 5–10 mm. long and 5 mm. thick at base, puberulous and 1–3-lamellate; cupule in young fruits depressed-globular embracing all but the apex and umbo of the acorn, when old saucer-shaped, embracing only the base of the acorn, 20–25 mm. in diam. and about 5 mm. high, softly minutely grey-puberulous, the margin thin, acute; lamellae about 5–7, obscurely denticulate; acorn depressed hemispheric, younger conical, the base deeply intruded, surface appressed silvery-grey-sericeous, 2 cm. in diam., 1.5 cm. high; umbo small, conical: *Quercus Canleyana*, King in Hook. f. Fl. Br. Ind. V. 613 (1888) and Ann. Calc. II. 64, t. 59.

PERAK: in dense forest up to 300 m. alt., Goping, Chanderiang, etc., *King's Collector* 5112!, 5121!, 5396!, 5475!, 5554!, 5623!, 5814!, 7274!. SINGAPORE: *Lobb*!; *Canley* 149; at Changi, *Ridley* 3386!; at Bukit Timoh, *Ridley*!.

King remarks that the ♂ and ♀ flowers are apparently produced on different trees; only local investigation can show if this is invariably the case; certainly all the specimens available have either ♂ flowers only or only ♀, not both.

18. *PASANIA WENZIGIANA*, Gamble. A large tree reaching a height of 18–24 m. and about 40 cm. in diam. of stem, branches spreading; branchlets slender with dark brown shining bark and very small lenticels, all parts except the inflorescence glabrous. *Leaves* coriaceous; elliptic or elliptic-oblong, abruptly caudate-acuminate

at apex, the tip obtuse, acute or cuneate at base; upper surface shining, lower dull; margin recurved; 8—15 cm. long, 3—5.5 cm. broad; midrib stout, prominent on both surfaces; main nerves 12—14 pairs, indistinct, slightly raised on the upper surface, very slightly curved to about 5 mm. from the margin and then joining in somewhat angular loops with lesser loops outside them; transverse nervules few, irregular and branching, enclosing the minutely areolate reticulation; petiole slender, dark, 8—11 mm. long. *Spikes*: ♂ 10—15 cm. long, solitary and axillary or in lax, spreading, terminal, leafless panicles, rhachises angular, grey-puberulous; bracteoles triangular-ovate, scarcely 1 mm. long, scurfy without: ♀ few, solitary, axillary. *Flowers*: ♂ solitary or in groups of usually 3; perianth cup-shaped, 1—1.5 mm. long, puberulous without, glabrous within, lobes 6, broad, ciliate; stamens 12 or sometimes more, filaments slender, anthers globose, small; pistillode cylindric, sericeous, white when dry and conspicuous: ♀ not known. *Fruits* in spikes up to 20 cm. long, usually solitary but sometimes 2—3 together one or more being undeveloped; rhachis very stout, rough; pedicel thick, scarcely 3 mm. long; cupule saucer-shaped, embracing only the base of the acorn, 2 cm. in diam., 4—6 mm. deep, the upper margin slightly incurved; lamellae 5—7, sericeous, prominent, thick, the edges entire; acorns depressed-globose, glabrous below, grey-sericeous towards the apex, 2—2.5 cm. in diam., 12—15 mm. high, the base intruded; umbo conical. *Quercus Wenzigiana*, King in Hook. f. Fl. Br. Ind. V. 613 (1888) and in Ann. Calc. II. 65, t. 58 B. *Q. Diepenhorstii*, Wenzig in Jahrb. Bot. Gart. Berl. 231 (not of Miquel).

PENANG: Government Hill, etc., *Curtis* 360!, 368!. PERAK: in open forest near Goping, up to 150 m. alt., *King's Collector* 5955!. MALACCA: *Griffith* K.D. 4482!: *Maingay* K.D. 1527!.—DISTRIB. Borneo.

19. PASANIA RASSA, Gamble. A large tree reaching a height of 18—24 m. and 60—90 cm. in diam. of stem; branches spreading; branchlets slender, dark-brown, rough, the innovations and inflorescence grey-pubescent, otherwise glabrous. *Leaves* coriaceous; narrowly lanceolate to elliptic-lanceolate, caudate-acuminate often obtusely at apex, acute at base and slightly decurrent; smooth on both surfaces, the upper shining, the lower dull and pale when dry; margins entire, recurved; 6—9 cm. long, 2—4 cm. broad; midrib slender, raised on both surfaces and sometimes pubescent; main nerves

obscure, 12—15 pairs, nearly straight to near the margin and there joined by somewhat angular loops, secondary nerves few; transverse nervules very irregular much branched enclosing the minutely areolate but obscure reticulation; petiole slender, 5—10 mm. long, occasionally (Sumatran specimens) longer, the upper part bordered by the decurrent margins of the blade. *Spikes* usually under 10 cm. long, slender, axillary or the ♂ in sparse terminal panicles, the ♀ solitary in lower axils; rachis of ♂ very slender, angular, grey-pubescent, of ♀ stouter; bracteoles very minute, ovate-acute. *Flowers*: ♂ in glomerules of about 3, rarely solitary; perianth cup-shaped, small scarcely 1 mm. long, lobes 6, puberulous, ciliate on the margins; stamens 10, filaments slender, anthers globose; pistillode large, very villous, white when dry; ♀ solitary, sessile, cupule obscurely ringed; perianth-lobes as in ♂ but smaller; styles 3, very short. *Fruit* in spikes up to 10 cm. long, solitary, sessile; cupules obconic below, saucer-shaped above and quite shallow, thin, 10—12 mm. broad, 3—5 mm. high; when quite young embracing the whole acorn, when ripe its base only, the edges acute, spreading; lamellae 4—6, sericeous, when quite young denticulate, when old entire broad and thickened; acorn ovoid-conic, smooth and shining, glabrous except just around the umbo, 15 to nearly 20 (var. ? *montana*, Hook. f.) mm. in diam. and height, the base much intruded; umbo conic, sharp. *Quercus Rassa* Miq. Fl. Ind. Bat. Suppl. 350 (1862) and Ann. Mus. Bot. Lugd.-Bat. I. 112; A. DC. Prodr. XVI. ii. 95; Hook. f. Fl. Br. Ind. V. 113; King Ann. Calc. II. 66, t. 60 A.

PENANG: Government Hill, *Curtis* 362!; West Hill at 600 m. alt., *Curtis* 363!; in dense forest at 600—700 m. alt., *King's Collector* 1689!; on Penang Hill, *Ridley* 9369!, *Fox* 10647!. PERAK: *Scortechini* 329!; at about 1400 m. alt., *King's Collector* 6957!, 6983!. MALACCA: at Bukit Besar, *Ophir Ridley* 10021!. PENANG, at Gunong Tahan, 1800 m. alt., *Wray & Robinson* 5440!. —DISTRIB. Sumatra, Borneo, Java (fide *Koorders*).

Var. *lanuginosa*, *Ridley* M.S. in Herb. Kew. Branchlets, under surface and midrib and leaves fulvous-pubescent.

SELANGOR: top of Semangkoh Hill, 1300 m. alt., *Ridley* 15576!

The variability of this species is noticed in the Fl. Br. Ind. and it may be well here to call attention to *Ridley's* remarks on the subject in his paper on 'New and rare Malayan Plants' in Journ. Str. Bv. R. As. Soc. No. 61 (1912), p. 36. His No. 12061 from Ulu Semangkoh mentioned in the same paper has much thicker and differently-shaped leaves and is probably a new species.

20. *PASANIA EICHLERI*, Gamble. A large tree reaching 24—30 m. in height and 30—60 cm. in diam. of stem; branches spreading, crown sometimes low; branchlets stout, shining, with whitish-brown bark studded in places with large pale often elongate lenticels. *Leaves* thinly coriaceous; elliptic-oblong, oblong or oblong-lanceolate, caudate-acuminate at apex, acuminate at base; both surfaces dull and pale olive-brown when dry and covered, especially the lower, with very minute whitish pubescence; margins entire; 15—30 cm. long 5—8 cm. broad; midrib stout, prominent on both surfaces; main nerves 10—12 pairs, distant, prominent beneath, very oblique, starting at an angle of 35° — 45° with the midrib, curving to and along the margin; transverse nervules irregular and indistinct as is the reticulation; petiole stout, 5—10 mm. long. *Spikes* up to 15 cm. long, axillary or in few-branched terminal panicles, ♂ ♀ or androgynous, sometimes with hermaphrodite flowers; rhachis much angled, grey-puberulous; bracteoles very small, ovate. *Flowers*: ♂ usually solitary; perianth nearly 2 mm. long, deeply cleft in 6 ovate acute puberulous lobes; stamens 12, filaments very long and slender, anthers small, ovate; pistillode small, pale brown-villous: ♀ also solitary, the cupule stout, perianth as in ♂; styles 3, very long, subulate, spreading, pubescent: ♀ with rather smaller perianth. *Fruits* in spikes 10—20 cm. long with a stout rhachis, pale and lenticellate like the branchlets; pedicels 0 or only 5 mm. long, stout; cupules thin with sharp edges, when young saucer-shaped and embracing one-half to nearly the whole of the acorn, when mature patelliform and nearly flat, 3—3.5 cm. in diam., and only embracing the base of the acorn, their edges free from it; lamellae 5—7, broad, flat, very minutely denticulate; acorn when young ovoid-conic with prominent umbo and the remains of the styles, minutely sericeous, when mature flattened depressed—turbinate sparsely sericeous becoming glabrescent, reaching 3 cm. in diam. and 1.5 cm. high, the basal attachment rather small, about 1 cm. in diam.; umbo small. *Quercus Eichleri*, Wenzig. in Jahrb. Bot. Gart. Berl. IV. 236 (1886); Hook f. Fl. Br. Ind. V. 615; King Ann. Calc. II. 72, t. 68.

PERAK: on low ground and up to about 500 m. alt. in dense forest, *King's Collector* 3875!, 4043!, 5290! 5570!, 6630!, 7289!, 7305!, 7384!, 8485!; at Assam Kumbong and Ralan Tujor, *Wray* 2577! 2607!.—DISTRIB: Sumatra (*Forbes* 3035!, 3183!, 3189!). Vern. 'Mempenung jantan,' 'Mempenung Putih' *Ridley*.

This species and *P. Curtisii*, Gamble, much resemble each other in leaves, but differ in other respects.

21. *PASANIA CLEMENTIANA*, Gamble. A tree; branchlets brown the younger ones black, bark with elongate lenticels. *Leaves* thinly coriaceous; oblong-lanceolate or oblanceolate, caudate-acuminate at apex, acutely attenuate at base; upper surface shining, olive-brown when dry, lower pale-brown dull; margins entire; 15–20 cm. long, 4–6 cm. broad; midrib stout, raised on both surfaces; main nerves 11–13 pairs, oblique, slender, at first nearly straight, curved to join in obscure arches close to the margin; transverse nervules rather distant, irregular, enclosing the areolate reticulation; petiole stout, about 1 cm. long. *Spikes*: ♂ (sometimes androgynous) under 10 cm. long, axillary and solitary or in terminal much branched panicles; rhachis grey-puberulous, angled; bracteoles triangular, very small: ♀ solitary, axillary. *Flowers*: ♂ in clusters of about 4; perianth cup-shaped about 1 mm. long, lobes 6 obtuse; stamens 12, filaments slender, anthers reniform, small; pistillode rather large, densely whitish-villous: ♀ solitary or in threes, the young cupules truncate-pyriform with 4 broad distinct lamellae, quite enclosing the fruit. *Fruits* solitary or in threes of which 1 or 2 undeveloped; cupules when young obconic, when old sessile and saucer-shaped, enclosing half the acorn, thick (4 mm.), about 3 cm. in diam. and 1 cm. deep, the margins incurved; lamellae about 5, broad, the margins entire; acorns turbinate, flattened at base with a broad attachment, 2–2.5 cm. in diam., 1 cm. high, glabrous; umbo conical. *Quercus Clementiana*, King in Hook. f. Fl. Br. Ind. V. 614 (1888) and Ann. Calc. II. 69, t. 63 A.

PENANG: *Maingay* K.D. 1529!; on Government hill, *Curtis* 3095!
PERAK: *Scortechini*!. MALACCA: at Sungei Udang, *Ridley*!.

22. *PASANIA OMALOKOS*, Schky in Engl. Bot. Jahrb. XLVII. 676 (1912). A large tree reaching a height of 24–30 m and 60–90 cm. in diam. of stem, branches spreading; branchlets brown, rough, longitudinally striate and lenticellate, the uppermost angular, grey-scurfy puberulous, bud-scales subulate-lanceolate. *Leaves* thinly coriaceous; elliptic-oblong or oblanceolate, abruptly and shortly obtusely acuminate at apex, cuneately attenuate at base; both surfaces glabrous and shining, dark green when fresh, olive-green when dry; margins entire; 5–13 cm. long, 2–4 cm. broad; midrib rather stout, raised on both surfaces; main nerves 15–20

pairs slightly prominent on both surfaces, nearly straight at first, joined near the margin by somewhat angular loops; transverse nervules irregular, reticulate and much branched, enclosing the areolate reticulation; petiole short, about 5 mm. long; stipules lanceolate, oblique. *Spikes* up to about 17 cm. long ♂ or androgynous, slender, grey puberulous, solitary and axillary or in sparse few-branched terminal panicles; rhachises slender, angled, bracts linear falcate, about 5 mm. long; bracteoles minute, ovate-acute. *Flowers*: ♂ in elongate clusters of usually 3—4, rarely solitary, perianth cup-shaped, very short, lobes 6, minute, incurved; stamens 12, filaments slender, anthers small; pistillode round, white-villous: ♀ not seen. *Fruits* usually solitary in spikes, about 10—12 cm. long with very stout rough rhachises; pedicel 0; cupules when young embracing nearly half the acorn, when mature only its base, saucer-shaped or flat, thick, the margins incurved, 2.5—3.5 cm. in diam. 6—7 mm. deep; lamellæ about 8—10, the lower ones broad and thick, the upper gradually narrower, all minutely tomentose, slightly undulate on the margins; acorns hemispheric or somewhat ovoid, glabrous except just round the umbo, shining, the base with wide circular intruded attachment, 1.5—2.5 cm. in diam., 1.5 cm. high: umbo small conical. *Quercus Omalokos*, Korth. Verh. Nat. Gesch. Bot. 214 (1839—42); Blume Mus. Bot. Lugd.-Bat: I. 301; Miq. Fl. Ind. Bat. I. i. 860 and Ann. Mus. Lugd.-Bat. I. 112; A. DC. Prodr. XVI. ii. 92; Wenzig in Jahrb. Bot. Gart. Berl. IV. 231; Hook f. Fl. Br. Ind. V. 614; King Ann. Calc. II. 70, t. 23 B. *Cyclobalanhus Omalokos*, Oerst. in Kjoeb. Vidensk. Meddel. 80 (1866).

PERAK: in dense forest on the hills up to 1200 m. alt., Goping, Thaiping, etc. *King's Collector* 5950!, 6901!, 8194!, 8447!; *Scortechini*!. MALACCA: at Sungei Hudang, *Derry* 583!; *Goodenough* 1227!.—DISTRIB. Sumatra (*Korthals*!). Vern 'Mempenung putih' *Ridley*.

23. *PASANIA LUCIDA*, Gamble. A large tree reaching a height of 24—30 m. or more with 60—90 cm. in diam. of stem, branches spreading; branchlets stout, glabrous, dark purplish-brown to nearly black when dry with scattered elongate lenticels, prominently angled and usually furnished with raised lines decurrent from the leaf-axils; bud-scales ovate-acuminate more or less persistent. *Leaves* rigidly coriaceous; cuneately oblanceolate or oblong, obtusely rounded or emarginate at apex, acuminate or long-cuneate at base; both surfaces glabrous and shining, dark green when fresh, reddish-

brown when dry; margins entire, recurved; variable in size, 8—20 cm. long, 3—8 cm. broad; midrib very stout, raised on both surfaces; main nerves 10—20 pairs, not prominent, irregular, at first nearly straight, near the margin branching angularly and anastomosing, transverse nervules an irregular much branched reticulation; petiole stout, short, 5—10 mm. long, glabrous. *Spikes* up to 20 cm. long in close panicles terminal or axillary to the uppermost leaves, ♂ most numerous, ♀ apparently less numerous and solitary, androgynous very frequent the ♂ flowers above the ♀ below; rhachis slender, angular, grey-puberulous; bracts linear-subulate, nearly 1 cm. long; bracteoles ovate, 1 mm. long. *Flowers*: ♂ solitary or in clusters of usually 3 together; perianth cup-shaped, 1 mm. long, pubescent, lobes 6, broadly ovate; stamens 12, filaments long, anthers very small globular; pistillode large, pale, densely villous: ♀ solitary or in clusters of 2—3, cupule rather thick, perianth as in ♂ but smaller, styles small, conical. *Fruits* usually solitary in spikes of about 15 cm. long with very thick rhachises deeply pitted with the prominent scars of abortive flowers; pedicel 0; cupule when young embracing nearly the whole acorn, when mature only its base, 2.5—3.5 cm. in diam., 5 mm. deep, saucer-shaped or flat, grey tomentose, the base of the much intruded; lamellae 8—13, when young very thick, the inner ones much inflexed and very narrow, when mature narrower the margin slightly undulate; acorn hemispheric hardly depressed at apex, truncate at base with a very broad attachment, smooth shining, glabrous except sometimes around the minute conical umbo, 3—3.5 in. in diam. 15—20 mm. high; pericarp thick, woody, the endocarp intruded in plates, star-like, into the seed. *Quercus lucida*, Roxb. Fl. Ind. III. 635 (1832); Miq. Fl. Ind. Bat. I. i, 863 and Ann. Mus. Lugd.-Bat. I. 166; Hook. f. Fl. Br. Ind. V. 614; King. Ann. Calc. II. 69, t. 64. *Q. cuneata*, Herb. Roxb.; Wall. Cat. 3732.

PENANG: *Maingay* K.D. 1526!; *King's Collector* 1810!; half way up Penang Hill, *G. King*!; at Chalet, *Curtis* 930!. PERAK: generally on low ground and up to 150 m. alt., *King's Collector* 3990!, 5086!, 5279!, 5307!, 5325!, 5351!, 5429!, 5675! 5682!, 6198!, 6500!, 6914!; at lower camp, Gunong Batu Putih, 1000 m. alt., *Wray* 998!, 1190!, at Waterfall hill, 600 m. alt., *Wray* 2217!, at Selama, *Wray* 4177. SINGAPORE: *King's Collector* 1255!; at Teban, *Ridley*!; at Chenchu-Kang, *Ridley* 1603!; at Bukit Mandai, *Ridley* 3414a!; *Machado*!.

24. *PASANIA CYCLOPHORA*, Gamble. A very large tree reaching 30—40 m. in height and 60—120 cm. in diam. of stem, branches spreading; branchlets stout, smooth, angular, glabrous, purplish-brown when dry, sparsely lenticellate; bud-scales lanceolate, tawny-puberulous, nearly 1 cm. long. *Leaves* coriaceous; oblong or oblong-lanceolate, acuminate often caudately at apex, acuminate at base; upper surface glossy dark green when fresh, brown and shining when dry, when young sometimes lepidote, lower silvery grey when fresh, yellowish-glaucous when dry with dense minute pale tomentum; margins entire, recurved; 15—30 cm. long, 5—10 cm. broad; midrib very stout and prominent, raised on both surfaces; main nerves 16—20 pairs, conspicuous, parallel, oblique, slightly impressed above, slightly curved to and along the margin, the apical ones meeting in loops; transverse nervules very many, fairly regular and parallel but curved, joined by rather obscure smaller nervules; petiole stout, 1—2 cm. long, the upper end bordered by the decurrent margins of the blade; stipules ovate, tawny-puberulous, very caducous. *Spikes* about 10—12 cm. long, ♂ or androgynous, solitary or in small axillary or terminal panicles on the new branchlets; rhachis angular, minutely puberulous or subglabrous; bracts ovate acute; bracteoles ovate acuminate, very many, usually 1 to each ♂ and 2 to each ♀ flower. *Flowers*: ♂ solitary or in clusters of 2—4, perianth cup-shaped, puberulous, 1.5—2 mm. long, lobes 6, ovate, acute; stamens 12, filaments slender, anthers very small, globose; pistillode rather small, white-villous when dry: ♀ solitary, cup with appressed scales, perianth as in ♂ but lobes less acute; styles 3 small, conical. *Fruits* very large, sessile on a thick rhachis up to 12 cm. long; cupules very thick (to 1 cm.), saucer-shaped, embracing half the acorn, the margins rounded and incurved, 4.5—6 cm. in diam. 2—2.5 cm. high, minutely tomentose without; lamellae up to about 10, rounded, the margin wavy, indistinct and irregular; acorn flattened, much depressed at the top, broadly attached at base, densely and minutely furfuraceous-tomentose, about 4 cm. broad and 1.5 cm. high, the inner walls of the pericarp protruded within star-like through the testa and cotyledons of the seed; umbo in the depression, conspicuous, conical, about 6 mm. high. *Quercus cyclophora*, Endl. Gen. Pl. Suppl. IV. ii. 28 (1847); A. DC. Prodr. XV. ii. 102; Miq. Ann. Mus. Lugd.-Bat. I. 113; Hook f. Fl. Br. Ind. V. 615; King Ann. Calc. II. 71, t. 67. *Q. depressa*, Roxb. Fl. Ind. III. 640 (not of H. B. K. or of Bl.). *Q. placentaria* Wall. Cat. 2779 and 2779 B. not of Bl.; Hance in Journ. Bot. 364 (1875). *Q. penangensis*, Miq.

Fl. Ind. Bat. I. i. 859. *Q. umbonata*, Hance in Journ. Bot. 241 (1874), 364 (1875).

PENANG: *Wallich* 2779!; *Maingay* K.D. 1528!; *Norris*!; *G. King*!; *Curtis*! 381; *Stoliczka*!. PERAK: on hills in dense forest up to 1000 m. alt., *King's Collector* 2402!, 6821!, 6888!; at lower camp Gunong Batu Putih, *Wray* 1207!. SELANGOR; at 15th mile, Pahang track, *Ridley* 8503!. SINGAPORE: *Wallich* 2779 B!; in Botanic Garden, *Hullett* 654!; at North Selitar, *Ridley* 115!.

25. *PASANIA COSTATA*, Gamble. A tree reaching a height of 18—24 m. and 60—90 cm. in diam. of stem, branches spreading; branchlets rather stout with smooth brown bark and small lenticels, the youngest slightly lepidote soon becoming glabrous; leaf-buds lanceolate with linear slightly falcate nearly glabrous scales about 1 cm. long. *Leaves* thickly coriaceous; elliptic-oblong or elliptic-lanceolate or -oblanceolate, abruptly caudate at apex, the acumen obtuse, acute or almost rounded at the base which is slightly decurrent on the petiole; upper surface bright green when fresh, olive-brown, shining and glabrous when dry, lower glaucescent, dull; margin entire, slightly recurved when dry; 10—20 cm. long, 4—7 cm. broad; midrib very stout, prominent on both surfaces; main nerves 10—14 pairs, indistinct, straight at first, then curving to meet in loops near the margin; transverse nervules irregular, distant, enclosing the minutely areolate reticulation which is conspicuous on both surfaces; petiole 7—17 mm. long. *Spikes* terminal or axillary, ♂ or ♀ or ♂ and ♀ together the latter the highest, minutely grey-puberulous: ♂ up to 25 cm. long, slender but stiff: ♀ about 15 cm. long, slender; bracteoles of ♂ conspicuous in bud, linear-subulate, 2—3 mm. long. *Flowers*: ♂ in clusters of usually 3, each cluster to a bracteole; perianth cup-shaped, 1 mm. long, cleft halfway down into 6—7 rounded lobes; stamens 12—15, filaments long, slender, anthers ovate apiculate; pistillode large, white-villous: ♀ solitary, distant, the cupule flattened on the rhachis, perianth-lobes as in ♂ but smaller; styles 3, very short. *Fruits* in stout spikes about 15 cm. long, distant, very large, 4.5 cm. in diam. when mature, 2.5 cm. high, very broadly turbinate, obliquely set on the very thick 1.5 cm. long pedicel which is ringed near the middle; rhachis like the branchlets; cupules when young embracing most of the acorn, turbinate and about 5-ringed, when mature obconic, minutely hoary, separate from the acorn but incurved over it for about 5 mm. at the top; lamellae 2, wide and

more or less oblique on the lower part, 3 closer together at the overlap; acorn patelliform, the exsert portion scutiform, slightly convex, chestnut-brown, shining, glabrous; umbo conical; walls of the pericarp very thick, at least 5 mm., the endocarp slightly protruded inwards in narrow plates. *Quercus costata*, Blume Bijdr. 522, Fl. Jav. Cupul. 25, t. 13, 14 and Mus. Bot. Lugd.-Bat. I. 301; Korth. Verh. Nat. Gesch. 212; A. DC. Prodr. XVI. ii. 93; Miq. Fl. Ind. Bat. I. i. 862, and Ann. Mus. Lugd.-Bat. I. 116; Wenzig in Jahrb. Bot. Gart. Berl. IV. 239; Hook. f. Fl. Br. Ind. V. 617; Koord. & Val. Bijdr. X. 60; King Ann. Calc. II. 81 t. 76 A; Koord. Exkurs. Fl. Jav. II. 70. *Lithocarpus scutigera*, Oudem. Annot. Crit. Cupul. Jav. 20, t. 12. *Cyclobalanus costata*, Oerst. Kjoeb. Vidensk. Meddel. 81 (1866).

PERAK: in hill forests up to 300 m. *King's Collector* 4891!, 5166!, 5584!, 5783!, 7277 (ripe fruit); *Scortechini*!.—DISTRIB. Java, Sumatra.

This species has usually been placed in Sect. LITHOCARPUS as believed to have the acorn completely attached to the cupule, but as after cutting through a good, quite ripe specimen I find this not to be the case, I have followed Oersted in transferring it to Sect. CYCLOBALANUS. King considers the Peninsular material to belong to Blume's var. *convexa*, but I cannot agree in this. Scortechini's specimens agree well with both Blumes' and Oudemans' figures, and the rest of the material differs only in having the fruit (much more mature) very broad and obconic instead of cylindrical. The thickness and hardness of the pericarp is most remarkable.

26. *PASANIA LAMPADARIA*, Gamble in Kew Bull. 177 (1914). A small tree; branchlets very stout with smooth dark-grey or nearly black bark, rough with dark rounded lenticels. *Leaves* very coriaceous; lanceolate, acuminate at apex with an oblique obtuse acumen, attenuate at base and more or less decurrent on the petiole; upper surface smooth, shining, lower whitish when fresh with a minute felted pubescence, grey when dry; margins entire, recurved; 20—25 cm. long, 6—10 cm. broad; midrib very thick and prominent; main nerves 12—14 pairs, at first nearly straight, curving to vanish along the margin; transverse nervules many, subparallel, slightly arched; reticulation obscure; petiole very stout, wrinkled, 1—1.5 cm. long, bordered partly by the decurrent margins of the blade. *Flowers* not known. *Fruits* (immature) sessile in stout spikes about 10 cm. long, usually 3 together, occasionally more, sometimes (the lower ones) single or in pairs; cupules enclosing about three-fourths of the half mature acorn; lamellae to each acorn about 5, minutely denticulate; acorns white-sericeous; umbo prominent, conical.

PERAK : at lower camp Gunong Batu Puteh, 1000 m. alt., Wray 1176! 'saplings used when dry as torches in fishing by Sakais'; camp on Ulu Batang Padang 1500 m. alt. Wray 1514!.

27. *PASANIA BLUMEANA*, Gamble. A tree reaching 12—15 m. in height, branches spreading; branchlets stout, greyish-brown, lenticellate, the ultimate ones shining, plumbeous, minutely pulverulent; resting-buds globose, the scales obtuse. *Leaves* coriaceous; elliptic-oblong or oblong-lanceolate, acuminate or cuspidate at apex, acute at base; upper surface glabrous, dull or shining, greyish-brown when dry, lower pale, very minutely stellate-tomentose; margin entire, recurved; 15—20 cm. long, 4—7 cm. broad; midrib stout, raised on both surfaces; main nerves 12—14 pairs, prominent beneath, parallel, straight at first, curving somewhat abruptly close to and along the margin; transverse nervules many, parallel; reticulation obscure; petiole very stout, 1—1.5 cm. long. *Spikes* usually ♂ or androgynous, slender, axillary or in terminal panicles; rhachis minutely grey-tomentose; bracteoles minute. *Flowers*: ♂ very small, solitary or in clusters of 3—4; perianth very short, lobes obtuse; stamens with very slender filaments and minute ovate anthers; pistillode grey-villous: ♀ solitary, the involucre scaly, perianth-lobes short; styles short, spreading. *Fruits* depressed-turbinate, solitary in dense spikes about 10—12 cm. long, the rhachis very stout, rough with prominent lenticels and lepidotepuberulous; pedicel stout, very short, about 5 mm. long; cupules thin, when very young produced above the ovary, in half-ripe specimens enclosing the whole acorn except the umbo, grey-pubescent and covered into prominent appressed or spreading subulate scales, when mature covering from two-thirds to nearly the whole of the acorn and splitting in vertical fissures, the scales in obscure rings; acorns depressed-turbinate till about half-ripe, when mature globose or hemispheric-conic, densely sericeous-tomentose, 1.5—2 cm. in diam. and 1—5 cm. high; umbo conical, surmounted by the persistent stigmas. *Quercus Blumeana*, Korth. Verh. Nat. Gesch. Bot. 208, t. 44 (1839—42); Bl. Mus. Bot. Lugd.-Bat. I. 288; A. DC. Prodr. XVI. ii. 103; Miq. Fl. Ind. Bat. I. i. 863 and Ann. Mus. Lugd.-Bat. I. 116; Wenzig in Jahrb. Bot. Gart. Berl. IV. 237; Hook. f. Fl. Br. Ind. V. 615; King Ann. Calc. II. 75, t. 69 B; Koord. & Val. Bijdr. X. 57; Koord. Exkurs. Fl. Jav. II. 69. *Cyclobalanuss Blumeana*, Oerst. in Kjoeb. Vidensk. Meddel. 81 (1866).

PERAK : *Scortechini*!; in Larut, 1000—1200 m. alt., King's Collector 3232!.—DISTRIB. : Java, Sumatra, Borneo.

The leaves in the Peninsular specimens are considerably larger than those figured by Korthals, but in other respects Sir G. King's identifications seem correct.

28. *PASANIA CONFRAGOSA*. Gamble. A large tree reaching a height of 24—30 m. and 60—90 cm. in diam. of stem; branches spreading; branchlets stout, smooth, greyish-brown, with few but rather large lenticels, the youngest scurfy; leaf-buds ovoid with small narrow acute scales. *Leaves* very coriaceous; elliptic or elliptic-lanceolate, abruptly and obtusely cuspidate-acuminate at apex, acute at base; upper surface dark green when fresh, more or less shining when dry, smooth, lower greyish when fresh minutely greyish appressed-pubescent when dry; margins slightly recurved; 10—18 cm. long, 3—7.5 cm. broad; midrib stout, prominently raised on both surfaces; main nerves 6—8 pairs, raised beneath, curving gradually to and along the margin; transverse nervules many, subparallel, indistinct as is the reticulation; petiole stout, 10—12 mm. long. *Flowers* unknown. *Fruits* sessile, solitary, globose, in stout or somewhat slender terminal or axillary spikes up to 20 cm. long, the peduncle about 4—5 cm.; rhachis like the branchlets; when ripe up to 3.5 cm. in diam. and 3 cm. high; cupules when half-grown thin enveloping three-fourths or more of the acorn, rugosely reticulated with appressed ovate acute keeled scales of which only the apex of the upper ones is free, when mature thicker and enveloping the whole acorn except the umbo, the scales thickened into irregular coarse tubercles; acorn globose when young, when mature somewhat depressed, minutely velvety; umbo prominent, the stigmas persistent. *Quercus confragosa*, King in Hook. f. Fl. Br. Ind. V. 616 (1888) and in Ann. Calc. II. 77. t. 71.

PERAK: in forest on low hills up to 150 m. alt. *King's Collector* 8123!, 8188!.

This is a very remarkable species especially in the difference between the young and the mature cupules.

29. *PASANIA WRAYII*, Gamble. A tree, branchlets rather stout, pale, shining, the young ones densely and minutely fulvous-tomentose. *Leaves* subcoriaceous; oblong-lanceolate, long—caudate-acuminate at apex, acute or obtuse and often unequal at base; both surfaces dull, minutely stellate-puberulous especially on the midrib, lower paler; margins recurved when dry; 13—20 cm. long, 3—5 cm. broad; midrib prominent, raised on both surfaces; main nerves 12—16 pairs, prominent especially on the lower surface,

curved slightly to just within the margin and then suddenly bent parallel to it; transverse nervules many, arched, often branching, enclosing the minute reticulation; petiole stout, tomentose, 3—5 mm. long. *Flowers* not known. *Fruits* sessile, solitary in axillary dense spikes under 10 cm. long of which the peduncle about half that length and, with the rhachis, fulvous-tomentose; cupule fulvous-tomentose, much depressed, 2 cm. in diam., 1 cm. high, when young almost discoid, enveloping the whole acorn and completely covered with stout simple at first incurved afterwards radiating rather soft spines which are usually hooked at the apex; acorn depressed, fulvous-sericeous. *Quercus Wrayii*, King in Ann. Roy. Bot. Gard. Calc. II. 77, t. 104 (1889).

PERAK: at Kota, Wray 2854!. PAHANG: at Telom, Ridley 13727!.

The description of the fruits is perforce taken from immature specimens.

30. PASANIA DISCOCARPA, Gamble. A large tree reaching 30—40 m. in height and up to 120 cm. in diam. of stem; branchlets purplish-brown with conspicuous large usually oblong lenticels; resting-buds small ovoid with ovate scales. *Leaves* coriaceous; lanceolate or oblong-lanceolate, long-acuminate and usually mucronate at apex, acute at base; upper surface glabrous, deep green when fresh olivaceous when dry, shining, lower paler and brown when fresh, with minute appressed cinnamomous pubescence; 8—16 cm. long, 3—5 cm. broad; midrib rather slender, slightly impressed above; main nerves 8—10 pairs, curving gradually to and along the margin, thin but prominent beneath; transverse nervules many, subregular, obscure as is the reticulation; petiole 5—8 mm. long. *Spikes* about 10 cm. long in erect terminal spreading tomentose panicles, lower ones many and ♂, the ♀ few and near the top of the panicles only; bracteoles minute, broad, obtuse, .5 mm. long, those of ♀ smaller and more acute. *Flowers*: ♂ very small in clusters of 2—4; perianth-lobes nearly free, ovate, about .7 mm. long, pubescent; stamens 12, filaments slender, anthers globose; pistillode of many separable villous scales: ♀ solitary; perianth-lobes very small; styles 3, subulate, spreading. *Fruit* sessile, hemispheric- or turbinate-conic, minutely tawny-pubescent, 1.5 cm. long, 2 cm. in diam.; cupule thin, completely enclosing the whole acorn except the umbo, concave at base and bearing scattered tufts or broken lines of simple or branching spreading pubescent sharp spines up to 8 mm. long; acorn minutely appressed-pubescent with retrorse

hairs, base very concave, umbo conical. *Quercus discocarpa*, Hance in Journ.-Bot. for 1874, 242; Hook. f. Fl. Br. Ind. V. 616; King Ann. Calc. II 76, t. 70. *Castanopsis discocarpa*, Hance in Journ. Bot. for 1878, 201.

PENANG: at Penara Bukit, 300 m. alt., Curtis 1155!. PERAK: in open hilly forest at 250—450 m. alt., Larut, King's Collector 5482!; at Gunong Bubu, Scortechini 841!.—DISTRIB. Bangka (*Teysmann*), Borneo (*Hallier*).

31. *PASANIA ACUMINATISSIMA*, Oerst. in Kjoeb. Vidensk. Meddel. 84 (1866). A tree up to 25 m. in height and 1.5 m. in diam. of stem; branchlets nearly black, lenticellate, slender, the youngest minutely puberulous; leaf-buds globose with 2—3 subulate scales at base. *Leaves* coriaceous, lanceolate or ovate-lanceolate, long acuminate at apex the acumen somewhat obtuse, acute or somewhat rounded and often unequal at base; upper surface when dry ashy-grey, shining, glabrous, lower surface reddish-brown, glabrous or minutely rufous-pubescent; margin entire or the upper half coarsely serrate, the serrations at the ends of the main nerves, usually reflexed when dry; 4—12 cm. long, 2—3.5 cm. broad; midrib slender, very slightly impressed above; main nerves 8—11 pairs, prominent beneath; transverse nervules many, subprominent, enclosing the areolate minute reticulation; petiole 5—10 mm. long, somewhat flattened. *Spikes* from the axils of the upper leaves, erect, solitary but paniculately arranged: ♂ very slender, almost filiform, slightly puberulous, under 5 cm. long; bracteoles ovate-acuminate glabrous except the villous tip, 1—1.5 mm. long: ♀ stouter up to 6 cm. long; bracteoles as in ♂. *Flowers*: ♂ solitary in the axils of the bracteoles; perianth-lobes free, much imbricate, orbicular, nearly 1 mm. in diam., the margins ciliate; stamens 10—12 or more, filaments very short, anthers rather large; pistillode villous with 1—2 rudimentary ovaries and stigmas embedded in the hairs: ♀ also solitary, distant, the cupule scaly; perianth-lobes as in ♂ but smaller; stamens sometimes present; styles 2—3, spreading, sub-clavate. *Fruits* in spikes up to about 10 cm. long, rachises like the branchlets; cupules (immature) obliquely ovoid, closely enveloping the whole acorn except the umbo, minutely fulvous-puberulous without, villous within, bearing 4—5 rather oblique rings of stout sharp erect or recurved tubercular spines; 15—20 mm. long, 10—12 mm. in diam.; acorn ovoid-apiculate, flattened on one side; umbo rounded. *Q. acuminatissima*, A. DC. Prodr. XVI. ii. 102 (1869);

Koord. Exkurs. Fl. Jav. II. 69. *Q. Junghuhnii*, Miq. Fl. Ind. Bat. I. i. 853 (1855); Oudem. Annot. Crit. Cupul. Jav. 15, t. 9, Wenzig in Jahrb. Bot. Gart. Berl. IV. 237; King Ann. Calc. II. 78, t. 73. *Q. fagiformis*, Jungh. in Nat. Tijdschr. N. Ind. Ser. 3, IV. 119 (1857) and in Bonplandia VI. 82 with picture of stem and roots; Miq. l.c. 870; Koord. & Val. Bijdr. X. 54. *Q. lineata*, Miq. (not of Bl.) Pl. Jungh. I. 10. *Castanea acuminatissima*, Bl. Mus. Bot. Lugd.-Bat. I. 283 (1850); Miq. l.c. 867. *C. ? sessilifolia*, Bl. l.c. 284; Miq. l.c. 867.

PERAK: at Gunong Bubu, *Scortechini* 832!.—DISTRIB. Java, at high elevations (*Blume, Teysmann, De Vriese, Junghuhn Kurz, Forbes* 335, 941).

Scortechini's specimens have entire leaves, but agree well with the Java specimens, which have often the leaves entire; they were identified with this species tentatively by King in Hb. Calc., and I do not doubt the correctness of his opinion. The tree is described in most of the works on the Flora of Java as having many stems and as putting forth countless suckers from the roots. The picture in 'Bonplandia' shows these forming a kind of hut and sheltering the natives. *Scortechini* gives no information regarding the stem and roots of the Perak trees.

32. PASANIA ENCLEISACARPA, Gamble. A large tree reaching 24—30 m. in height and 60—90 cm. in diam. of stem, branches spreading; branchlets rather slender, dark greyish brown to nearly black, furrowed, smooth, youngest ones whitish-lepidote. *Leaves* chartaceous; elliptic or elliptic-oblong, abruptly caudate-acuminate at apex the acumen obtuse, acute at base; upper surface dark green when fresh, dark grey when dry, glabrous, shining or dull, lower silvery-grey when fresh, plumbeous when dry and sublepidote; margins entire; 10—17 cm. long, 4—6 cm. broad, sometimes smaller; midrib fairly strong, slightly raised on both surfaces; main nerves 7—9 pairs, boldly curving to and along the margin, the upper ones to meet in loops; transverse nervules few, distant, enclosing the areolate reticulation; petiole slender, 1 cm. long. *Spikes*: ♂ and ♀ usually separate, but sometimes androgynous the ♂ flowers above the ♀ below: ♂ slender, up to 20 cm. long or more, many together in lax terminal grey-pubescent panicles; bracteoles very small, ovate, acute: ♀ and androgynous nearly as long, axillary, solitary. *Flowers*: ♂ in somewhat elongate clusters, rarely of only 2—3; perianth cup-shaped, 1 mm. long, cleft about half way down in 6 slightly acute pubescent lobes; stamens 12, filaments slender, anthers ovoid; pistillode large, often oblong, very villous: ♀ soli-

tary or rarely 2—3 together, on a very stout upcurved flattened pedicel; cupule thick, faintly 2—4-annular; perianth as in ♂; ovary densely silky; styles 3, spreading. *Fruits* hemispheric, 2—3 cm. in diam., 1.5—2 cm. high, in stout spikes up to 20 cm. long; rhachis like the branchlets; enlarged pedicel very stout, 1—1.5 cm. long, obconical, flattened; cupule thin, smooth, chartaceous, reddish-brown when dry, enveloping the whole acorn except the umbo, the margin often split, with 4—5 faint wavy rings, which are again connected by obscure straight vertical lines; acorn densely white appressed-sericeous with retrorse hairs, the base deeply hollowed out, the apex broadly conical tipped with the remains of the stigmas; endocarp with intruded plates, the cotyledons thus presenting a shallow conic star-like figure of about 10 rays enveloping the conical intruded endocarp. *Quercus encleisacarpa*, Korth. in Verh. Nat. Gesch. Bot. 208, t. 45 (1839-42), Blume Mus. Bot. Lugd.-Bat. I. 288; A. DC. Prodr. XVI. ii. 103; Miq. Fl. Ind. Bat. I. i. 862 and Ann. Mus. Lugd.-Bat. I. 116; Wenzig in Jahrb. Bot. Gart. Berl. IV. 238; Hook. f. Fl. Br. Ind. V. 617; King Ann. Calc. II. 80, t. 75. *Cyclobalanus encleistacarpa*, Oerst. in Kjoeb. Vidensk. Meddel. 81 (1866).

PENANG: on Government Hill, *Curtis* 254!; in dense forest at 300 m. alt., *King's Collector* 1581!. PERAK: in forest up to about 300 m. alt., *King's Collector* 2828!, 5143! (small leaves 6—7 cm. by 2.5—3 cm.), 5477!, 5523!, 5594!, 5682!, 5689!, 5739!, 7541!; *Wray* 3291!. SELANGOR: at Rawang, *Ridley* 10474!. SUNGAI UJONG. MALACCA: *Derry* 1213!. SINGAPORE: *Canley*!.—DISTRIB. Sumatra (*Korthals*, *Forbes* 2943!). Vern. 'Mempenung putih,' 'Berangan babi hutan' *Ridley*.

The Sumatra specimens have the fruit more conical and longer (2 cm. or more) than the Peninsular ones which are almost flat or only slightly conical at top.

Var. *aperta*, King in Hook. f. Fl. Br. Ind. V. 617. Acorn smaller more nearly globose, the cupule always open for the upper fourth, the diam. of the orifice 1.5 cm. in ripe or nearly ripe specimens, margin often thickened. King l.c.

PENANG: *Maingay* K.D. 1531!; Government Hill at 600 m. alt., *Curtis* 366!. PERAK: in forest on the hills up to 1200 m. alt., *King's Collector* 4855!, 8303!; *Scortechini*!.

33. PASANIA ROBINSONII, Gamble. A tree, branches stout,

dark-coloured. *Leaves* coriaceous; lanceolate, acuminate, acute at apex, narrowed and cuneate at base; upper surface brown when dry, lower silvery except the brown nerves; 15 cm. long, 5 cm. wide; main nerves 11 pairs, raised beneath; transverse nervules parallel. *Spikes* in erect racemes, numerous, terminal, 8 cm. long, on branches 12 cm. long; base 3 mm. long; rhachis scurfy. *Flowers*: ♂ sessile; perianth lobes 6, short, dentiform, acute, pubescent; stamens 12, anthers ellipsoid; pistillode pulvinate, silky; bracts very small: ♀ on separate spikes; styles 3, short. *Fruit* when young with the cupule covering the acorn and covered with short appressed triangular scales, when mature the cupule thin, free from the acorn except at base and covering all but the umbo, splitting at the top into 5 irregular lobes, pubescent, faintly vertically ribbed but without rings, 1.5 cm. long; acorn rather longer, ovoid, tapering at apex, silky; umbo short with 3 persistent styles. *Quercus Robinsonii*, Ridley in Journ. Fed. Mal. States V. 46 (1914).

SELANGOR: Gunong Mengkuang Lebah, 1500—1700 m. alt., Dyak Collector of the States Museum.

I have seen no specimens, the description is taken from Ridley's.

34. *PASANIA MAINGAYII*, Schky in Engl. Bot. Jahrb. XLVII. 627 (1912). A very large tree; branchlets fulvous with pale lenticels, young branchlets and inflorescence minutely fulvous-tomentose. *Leaves* coriaceous; elliptic-oblong or obovate-oblong, shortly acuminate at apex, cuneately acute at base; upper surface olive-brown when dry, minutely lepidote pubescent on the midrib and nerves otherwise nearly glabrous, under surface covered with very minute pale fulvous stellate pubescence; margin entire; 20—25 cm. long, 7—15 cm. broad; midrib rather stout, prominent on both surfaces; main nerves 15—20 pairs slightly raised above, slightly curving to within the margin and then sharply bent to join in intramarginal loops; transverse nervules many, subparallel, often branched, more distinct on the upper than on the lower surface, and enclosing the minutely areolate reticulation; petiole stout, 2.5—3 cm. long, minutely tomentose, bordered above by the decurrent margins of the blade. *Spikes*: ♂ about 12 cm. long, very slender: ♀ solitary, 16 cm. long or more. *Flowers*: ♂ in elongate rather distant clusters on the fulvous-tomentose rhachis; bracteoles very small, lanceolate, acute; perianth cup-shaped, 1—1.25 mm. long, cleft nearly to the base in almost lanceolate villous lobes; stamens 12, filaments slender, anthers globose; pistillode usually elongate, very villous:

♀ solitary; cupule covered with minute scales arranged in lamellae; perianth as in ♂ but much smaller; styles minute. *Fruits* in thick racemes, 10—15 cm. long; narrowly pyriform with truncate umbonate apex, 3.5 cm. long, 2—4 cm. in diam.; pedicel thick, erect, nearly 1 cm. long; cupules woody, embracing the whole acorn and adherent to it except at the top, smooth and minutely tomentose with about 3—6 obscure oblique lamellae; acorn confluent with the inner walls of the cupule, the flattened top sericeous; umbo small, exsert; pericarp hard, corky, about 5 mm. thick, endocarp walls slightly intruded in narrow plates. *Quercus Maingayii*, Benth. in Hook. Ic. Pl. t. 1314 (1880); Hook. f. Fl. Br. Ind. V. 617; King Ann. Calc. II. 82 t. 77.

PENANG: *Maingay* K.D. 1464!; *Curtis* 267!. SELANGOR: 15th mile, Pahang track, *Ridley* 8588!.

Wray 1142! from Lower Camp, Gunong Batu Putih, resembles this very closely in its branchlets and leaves, the only noticeable difference being that there are more main nerves. The fruits, however, of which there are only very young specimens, are in clusters of 1—3, more usually one or two abortive, but all connected and having cupules with irregular wavy hardened lamellae, while in *P. Maingayii* the fruits seem to be always solitary.

Wray 1097! also from Lower Camp, Gunong Batu Putih, consists of branchlets with ♀ flowers in terminal panicles of spikes and a few very young conspicuously lamellate fruits. It may perhaps, as suggested by Sir G. King, belong to *P. Javensis*, (Bl.) Prantl with which it agrees fairly well in leaves.

35. *PASANIA BECCARIANA*, Prantl. in Engl. & Prantl. Naturl. Pflanzenfam. III. i. 55 (1888). A tree, reaching 18—21 m. in height; branchlets slender, brown, the young ones minutely fulvous-puberulous; bud-scales lanceolate about 3 mm. long. *Leaves* subcoriaceous; lanceolate or narrowly elliptic, obtusely acuminate at apex, acuminate at base; upper surface glabrous, shining, lower pale greyish-brown, minutely hoary-pubescent; margin entire; 6—9 cm. long, 2—3 cm. broad; midrib slender, raised above; main nerves 8—10 pairs, curving gradually at first, more sharply close to the margin which they follow; transverse nervules many, obscure as in the reticulation; petiole slender, 1—1.5 cm. long. *Spikes* solitary from the upper leaf-axils forming a few-branched apparently terminal panicle, ♂ up to 7, ♀ to 6 cm. long. *Flowers*: ♂ very small, in clusters in the axil of an ovate pubescent bracteole; perianth-lobes 5—6, ovate acute; stamens 10—12 with very slender filaments and ovoid anthers; pistillode white-villous: ♀ (rather old) with a subcylindric about 8-ringed involucre; perianth very small; styles 3, short. *Fruit*

ovoid or obovoid, up to 7 cm. long, 4 cm. in diam., in short spikes with a stout fulvous-puberulous rhachis; cupules woody, thick-walled, closely enveloping the whole acorn except the styles and partly adnate to it, ringed externally with 5—7 prominent rings joined by many obscure longitudinal lines; acorn ovoid with very hard pericarp. *Quercus Beccariana*, Benth. in Hook. Ic. Plant. t. 1315 (1880); Hook. f. Fl. Br. Ind. V. 617; King Ann. Calc. II. 83, t. 78.

SINGAPORE: *Murton* 61! "abundant, the wood very brittle and useless."—DISTRIB. Borneo (*Beccari* 3310!).

3. CASTANOPSIS, Spach.

Trees, rarely shrubs, deciduous or evergreen. *Leaves* entire toothed or lobed. *Flowers* monœcious, in erect spikes, bracts small; spikes usually either ♂ or ♀ only, sometimes androgynous. *Perianth* cup-shaped, lobes usually 6. *Stamens* usually 12, sometimes less, at the base of the perianth-cup, filaments slender; anthers small, ovate or globose. *Pistillode* in ♂ flowers a villous cushion. *Ovary* after fertilization 3-celled; ovules 2 in each cell; styles 3, cylindric, stigma a terminal pore as in *Pasania*. *Fruit* of 1—4 ovoid or plano-convex nuts covered by the closed fruiting involucre (cupule) and sometimes (when 1 nut) adnate to it, the involucre irregularly dehiscent and covered in more or less cyclic arrangement with clusters of spines or tubercles; pericarp of nuts where free from the involucre coriaceous. *Seeds* usually 1 to each nut.—DISTRIB. One species in N. America, the rest of tropical or sub-tropical Asia.

Nuts usually 3, not adherent to the cupule.

Fruit-cupules more or less covered with spines.

Spines of the fruit 1 cm. long or more, needle-like, hairy, in dense tufts covering very nearly the whole cupule and concealing its surface.

Spines shortly strigose-hairy; leaves ovate, under 10 cm. long, 4 cm. broad, minutely tawny puberulous beneath

1. *C. malaccensis*.

Spines with long shaggy hairs; leaves elliptic, usually over 10 cm. long, 4 cm. broad, densely ferruginous-pubescent beneath

2. *C. Scortechinii*.

Spines of the fruit at most 1 cm. long, subulate, minutely tawny-pubescent, in scattered tufts or rough lines covering the cupule partly.

Nuts usually 3, spines about 5 mm. long in

- tufts not clearly arranged in rings but usually stalked; leaves beneath furfuraceous-villous; branchlets hardly lenticellate
- Nuts usually 1, spines 6—10 mm. long in tufts arranged in rings and not stalked; leaves beneath scaly and stellate-pubescent; branchlets prominently lenticellate.
- Spines stout, flattened, curved, under 1 cm. long, covering most of the cupule; fruits globose or double-globose, broader than long.
- Spines very numerous, fairly slender; leaves very large, over 40 cm. long, 12 cm. broad.
- Spines rather scanty, very stout; leaves small, under 16 cm. long, 6 cm. broad ..
- Fruit cupules without spines but bearing short pyramidal tubercles.
- Tubercles sharp when dry, 3—3.5 mm. high; leaves coriaceous, more or less elliptic, under-surface rufous-puberulous ..
- Tubercles not sharp, scarcely 1 mm. high; leaves chartaceous, more or less lanceolate, under-surface glabrous ..
- Nut 1, adherent within to the cupule.
- Fruit cupules covered with sharp subulate spines; spines staghorn-like in tufts on the top of thick stalks.
- Fruits globose, 5—6 cm. in diam.; spines 10—15 mm. long, the tufts regular except a bare patch on the inner side; leaves large, oblong or elliptic, tawny-velvety beneath ..
- Fruits oblong or globose, 2—3 cm. in diam.; spines 8—10 mm. long, the tufts often in oblique bands, no bare patch; leaves rather small, lanceolate, somewhat glaucescent beneath ..
- Fruit-cupules covered on the outer surface with stout flat triangular spines 7—9 mm. long; fruits obovoid-hemispheric, bare on the inner surface; leaves small, lanceolate, ashy- or tawny-pubescent beneath ..
- Fruit-cupules with no or only short tubercles, flattened on inner side.
- Fruits obovoid, 2.5 cm. in diam.; tubercles short, pyramidal, in transverse ridges; leaves elliptic, under-surface minutely pubescent ..
- Fruits pyriform, 2.5 cm. in diam.; tubercles none, only short vertical ridges; leaves lanceolate, under-surface only pubescent on midrib ..
3. *C. fulva*.
4. *C. costata*.
5. *C. catappaeifolia*.
6. *C. Andersoni*.
7. *C. Hullettii*.
8. *C. sumatrana*.
9. *C. megacarpa*.
10. *C. Ridleyi*.
11. *C. Wallichii*.
12. *C. nephelioides*.
13. *C. Ourtisii*.

1. *CASTANOPSIS MALACCENSIS*, Gamble in Kew Bull. 178 (1914). A tree; branchlets slender with dark brown bark scarcely at all lenticellate ultimate ones tawny-pubescent; leaf-buds small, ovoid, the scales ovate-acute. *Leaves* thinly coriaceous; ovate or lanceolate, acuminate and usually mucronate at apex, rounded, often unequally at base; upper surface scaly-puberulous when quite young, afterwards glabrous, olive-green when dry, lower surface minutely tawny-puberulous; margin entire; 5—10 cm. long, 3—4 cm. broad; midrib slender, impressed above; main nerves 8—10 pairs, curved to and along the margin where they disappear in small loops; transverse nervules very many and close enclosing the areolate reticulation and with it conspicuous on the upper surface when dry; petiole slender, 8—10 mm. long. *Spikes* and *flowers* not known. *Fruits* (immature) globose, 1.5—2 cm. in diam., in slender axillary spikes up to 10 cm. long, rhachis under 3 mm. in diam.; cupule thin, densely and almost completely covered with tufts of spreading straight pubescent needle-like spines 1—1.5 cm. long, the spines rarely branched, geniculate at base and covered except the extreme tips with short strigose tawny hairs; nuts usually 3, silky.

MALACCA: Maingay K.D. 1461!; at Brisu, Derry 947!.

Maingay's specimens in Herb. Calcutt. have the fruits of *Pasania sundaica* in an envelope attached.

2. *CASTANOPSIS SCORTECHINII*, Gamble in Kew Bull. 178 (1914). A tree; branchlets stout, with grey rough bark, conspicuously furfuraceous-puberulous especially the ultimate ones; leaf buds ovoid, the scales lanceolate, acuminate, spreading, about 5 mm. long. *Leaves* subcoriaceous; elliptic or slightly oblanceolate, cuspidate-acuminate at apex, acute at base; upper surface glabrous except the midrib, olive-brown when dry, lower thickly ferruginous-pubescent; margin entire; 8—12 cm. long, 3—5 cm. broad; midrib slender, slightly raised and minutely puberulous on the upper, more prominent and pubescent on the lower surface; main nerves 12—15 pairs, slender and slightly impressed above, little curved at first more so close to the margin where they disappear along it; transverse nervules fairly numerous, rather irregular, reticulation obscure; petiole stout, very short, ferruginous-pubescent, 5 mm. long. *Spikes*: ♂ not known: ♀ about 15 cm. long axillary and lateral on upper branchlets; rhachis grey and furfuraceous-pubescent; bracteoles short, obtuse. *Flowers*: ♀ usually, only surrounded by a short cup of bracteoles. *Fruits* globose about

2 cm. in diam., rhachis of spike scarcely thickened; cupule densely covered with tufts of branching staghorn-like very sharp spines up to 12 mm. long, the spines covered with long shaggy ferruginous hairs.

PERAK: (without locality or number) *Scortechini* !.

3. *CASTANOPSIS FULVA*, Gamble in Kew Bull. 179 (1914). A tree reaching 18—24 m. in height and 45—60 cm. in diam. of stem, branches spreading; branchlets stout, dark purplish brown, covered, especially when young, with dense fulvous tomentum, hardly lenticellate; buds ovoid, the scales ovate, acuminate, tomentose. *Leaves* coriaceous; elliptic or sometimes elliptic-oblong, shortly and abruptly acuminate at apex, acute or somewhat rounded at base; upper surface bright green when fresh, bright brown shining and glabrous when dry, lower 'speckled brown and grey' when fresh, strigosely furfuraceous-villous and fulvous when dry; margin thickened, recurved; 8—16 cm. long, 3—7 cm. broad; midrib stout, impressed above, fulvous-tomentose when dry; main nerves 12—16 pairs, parallel, starting nearly at right angles with the midrib and slightly curving to the margin and there breaking up into diminishing loops; transverse nervules not prominent, rather irregular; petiole 12—20 mm. long, fulvous-tomentose. *Spikes*: ♂ not known: ♀ up to 18 cm. long, the rhachis grey-tomentose; bracts lanceolate. *Flowers*: ♀ 1—4 but usually in threes, surrounded by an involucre of many grey-tomentose ovate-lanceolate imbricate scales; perianth densely grey-tomentose; styles short spreading. *Fruits* globose, 2—2.5 cm. in diam. in spikes up to about 20 cm. long; cupule thin, more or less densely covered with fascicles of curved or staghorn-shaped sharp spines which are flattened and grooved and tawny-villous except the points and about 5 mm. long, the fascicles usually on stout stalks; nuts 1—4, usually 3, separating from the cupule, the pericarp sericeous villous; umbo rather large.

PERAK: in dense forest on low hills at 90—150 m. alt., Batang Padang, *King's Collector* 7751 !. SELANGOR: at Sungei Buloh, Vern. 'Kertak Tanga' *Mohammed Hashim* for *A. M. Burn-Murdoch* 381.

Sir George King identified the Perak specimens with *C. Hystrix*, but with some doubt. The same doubt is also expressed by a? in the Fl. Br. Ind. I cannot think that they can be anything but quite distinct from any form of *C. Hystrix* and have no hesitation in describing the new species.

4. *CASTANOPSIS COSTATA*, A. DC. Prodr. XVI. ii. 110 (1864).

A fine tree reaching 12—15 m. in height and 60—70 cm. in diam. of stem, branches spreading; branchlets stout, glabrous when old, minutely tawny-pubescent when young; bark greyish-brown to nearly black, prominently studded with large pale lenticels; buds globose, 5 mm. in diam., the scales ovate, obtuse, grey-tomentose. *Leaves* chartaceous or subcoriaceous; elliptic or elliptic-oblong, shortly and often abruptly acuminate at apex, acute or rounded at base; upper surface bright green when fresh, olive-green when dry, glabrous above except the midrib, lower reddish-brown when fresh, also when dry, covered with minute fulvous scales and stellate pubescence; margin slightly recurved; 8—16 cm. long, 3.5—7 cm. broad; midrib moderately stout, raised and dark-tomentose on the upper, raised on the lower surface; main nerves 12—16 pairs, sub-parallel, impressed above, slightly curved at first, more abruptly so near the margin; transverse nervules many, obscure; reticulation scarcely visible; petiole 10—15 mm. long, thickened at base. *Spikes* slender, 10—20 cm. long, the ♀ usually above the ♂ below, in loose terminal or axillary tawny-pubescent panicles; bracteoles ovate-acuminate, about 2 mm. long. *Flowers*: ♂ solitary or in rather distant clusters on the rhachis; perianth tawny villous, cut nearly to the base, the lobes acute; stamens with slender filaments; pistillode densely villous: ♀ usually in threes surrounded by an involucre of soft scales; perianth as in ♂; staminodes like minute stamens, usually 12; styles 3, short, spreading. *Fruit* globose, slightly depressed, 2—3 cm. in diam., in dense spicate clusters up to about 10 cm. long; cupules thin, covered, in more or less concentric rings, with fascicles of straight or curved sharp grooved, often flattened spines which are hardly subdivided and not on stalks, and about 6—10 mm. long; nut usually solitary, the pericarp densely fulvous-sericeous; umbo prominent. Miq. Ann. Mus. Lugd.-Bat. I. 120; Scheff. Obs. Phyt. II. 50 (var. *bancana*). *C. trisperma*, Scheff. l.c. *Castanea costata*, Blume Mus. Bot. Lugd.-Bat. I. 284; Miq. Fl. Ind. Bat. I. i. 866.

PERAK: at elevations up to 1500 m. alt., *King's Collector* 2909!, 3651!, 6975!; at Thaipeng, Vern. 'Buah Brangan', *Wray* (fruits edible); *Scortechini*!.—DISTRIB. Java, Sumatra, Bangka.

Sir G. King in his Monograph, and in the Flora of British India and Koorders. Exkurs. Fl. Jav. all put this under *C. javanica*, but in my opinion the fruit of the two species is so distinct that they must be kept separate.

5. *CASTANOPSIS CATAPPAEFOLIA*, King in Hook. f. Fl. Br. Ind.

V. 621 (1888). A large tree reaching 18—24 m. in height and 40—50 cm. in diam. of stem, branches spreading; branchlets very stout, dark brown to nearly black with small inconspicuous lenticels, ultimate ones when young furfuraceous-puberulous; leaf buds large, perulate, the scales lanceolate 1—1.5 cm. long, stiff, nearly glabrous. *Leaves* coriaceous, very large; oblanceolate, acute at apex, gradually narrowed, almost cuneately, at base; upper surface glabrous except on the midrib and nerves, shining, lower dull, very minutely puberulous; margin entire; 40—50 cm. long, 12—20 cm. broad; midrib very stout, raised and puberulous on both surfaces; main nerves about 25—30 pairs, impressed keeled and puberulous above, very prominent beneath, parallel, starting nearly at right angles with the midrib and only slightly curving to near the margin and then somewhat abruptly to join each other in loops; transverse nervules rather few but prominent, again transversely joined and enclosing the rather obscure reticulation; petiole very stout, rugose, 10—15 mm. long. *Spikes*: ♂ not known: ♀ 25—30 cm. long, stout, with black angular rhachis minutely puberulous. *Flowers*: ♀ usually 3 together in the axil of an obtuse bracteole enclosing a cup of smaller bracteoles; perianth very small; styles 3, short, spreading, slender. *Fruits* globose or double-globose and then each half about 4 cm. in diam., minutely fulvous-puberulous, sessile, in spikes with a very stout rhachis; cupule thin, crustaceous, when double splitting vertically, covered externally with closely packed tufts of simple, subulate, flattened, striate, very sharp spines about 7 mm. long, the tufts in obscure oblique bands, the inner face more or less free; nuts 1—3, of which one usually small and empty, the good ones ovoid-globose, densely tawny-sericeous except the rather small rugose glabrous base, 2—2.5 cm. long. *King Ann. Calc. II.* 100, t. 92.

PERAK: in open forest on low hills at 100—150 m. alt., *King's Collector* 8137 l.

6. *CASTANOPSIS ANDERSONI*, Gamble in *Kew Bull.* 179 (1914). A tree; branchlets moderately stout with greyish-brown bark, the ultimate ones brown, minutely fulvous-pubescent; leafbuds globose, perulate, glabrous, the scales ovate, acute or acuminate. *Leaves* thinly coriaceous; obovate or oblanceolate or elliptic-oblong, acute at apex, acutely attenuate at base; glabrous, upper surface when dry shining, olive-brown, lower dull reddish-brown; margin entire, slightly recurved; 8—16 cm. long, 3—6 cm. broad; midrib slender,

raised on both surfaces; main nerves 10—15 pairs, slightly raised on both surfaces, curved to and along the margin and then ending in small diminishing loops; transverse nervules obscure, subparallel, enclosing the areolate reticulation; petiole slender, 1.5—2.5 cm. long. *Spikes*: ♂ slender, up to 20 cm. long in axillary or terminal panicles; rhachises fulvous-puberulous: ♀ not seen. *Flowers*: ♂ solitary or in few-flowered clusters; bracteoles ovate, acute, 1 mm. long; perianth-lobes 6, nearly free, ovate, acute or obtuse, villous, ciliate on the margins, 1 mm. long; stamens 12 with long filaments and very small globose anthers; pistillode very villous, often obscurely 3-lobed. *Fruits* sessile, globose or double-globose and then transversely elongate, obscurely 4-channelled, in stout spikes about 15 cm. long, the rhachises 5 mm. thick or more; 2.5 cm. high, 3.5 cm. long, 2 cm. broad; cupules thick-walled, studded scantily with clusters of subulate, simply or slightly branched, fulvous-puberulous curved, flattened, striate, sharp spines 5—10 mm. long when ripe; nuts 3 of which or 2 sometimes empty, ovoid-complanate, densely rufous-sericeous except the rugose base.

MALACCA: at Sungei Hudang, *Goodenough* 1593!. SINGAPORE: *T. Anderson* 85!; *Kurz*!; *Hullett* 74!; at Changi, *Ridley* 3388!, at Tanglin, *Ridley* 3389!, in garden jungle *Ridley* 10162!, 11353!.

This species comes very near to *C. Schefferiana*, Hance in Journ. Bot. 200 (1878); King l.c. 105, t. 99 but the leaves are longer, have more main nerves and a longer petiole and the spines on the fruit are at least twice as long.

7. *CASTANOPSIS HULLETTII*, King in Hook. f. Fl. Br. Ind. V. 623 (1888). A large tree, reaching 18—24 m. in height and 60—90 cm. in diam. of stem, branches spreading; branchlets stout with dark brown or nearly black bark and large prominent usually elongate lenticels, ultimate ones minutely scurfy, fulvous-tomentose; leafbuds ovoid, perulate, the scales ovate acute, fulvous-tomentose. *Leaves* coriaceous; elliptic or elliptic-lanceolate or oblong-lanceolate, acute acuminate or very shortly cuspidate at apex, acute or rounded and often unequal at base; upper surface glabrous, shining, dark green when fresh, olive-green when dry, lower surface dull, rufous and very minutely puberulous; margin entire, hard and recurved; 12—24 cm. long, 5—11 cm. broad; midrib stout, prominent on both surfaces; main nerves 15—18 pairs, prominent beneath, parallel, curved to and along the margin where they vanish; transverse nervules rather scanty, arched and irregular, rather obscure as is the reticulation; petiole 2—3 cm. long, swollen and rugose below,

bordered above by the decurrent margins of the blade. *Spikes* rather slender, up to 15 cm. long, in axillary or terminal many-branched fulvous-tomentose panicles, ♂ many, ♀ fewer, usually from axillary branches, some androgynous. *Flowers*: ♂ in round or elongated clusters of up to 5; bracteole ovate acuminate, 1.5 mm. long; perianth-lobes 6, nearly free, irregular but usually ovate acute, villous, scarcely 1 mm. long; stamens 12 with long usually twisted filaments and very small globose anthers; pistillode thick, villous: ♀ in groups of 3 with one outer bracteole as in ♂ and many smaller in a cup; perianth-lobes as in ♂ but smaller; styles 3, short, conical. *Fruits* sessile when ripe, very shortly thickly pedicelled when young, in dense woody spikes up to 15 cm. long, the rhachis very stout, 1 cm. in diam.; cupules when young depressed-globose with 3-4 vertical channels and between them studded with groups of short pyramidal sharp tubercles; when mature depressed-obovoid, minutely fulvous-tomentose, usually constricted by shallow channels, 3 cm. high, 4-4.5 cm. long, 3-3.5 cm. thick, the umbo prominent; between the channels about 4-6 curved more or less horizontal but oblique raised ridges studded with many sharp pyramidal tubercles 3-3.5 mm. high; dehiscing to near the base in 3-4 unequal valves; nuts 2-4, hemispheric-complanate, nearly 2 cm. high, the upper part chestnut-brown, shining, sparsely covered with retrorse fulvous hairs, the base rugose, dull, glabrous. King in Ann. Calc. II. 104, t. 98.

PENANG: in forest up to 600 m. alt., *King's Collector* (*Kunstler*) 1672!, 2266!, 4844!, 4909!, 5261!; on Government Hill, 300 m. alt., *Curtis* 419!; *Ridley*!. PERAK: in open forest up to 300 m. alt., *King's Collector* 5261!, 7753!; *Scortechini*!. MALACCA: *Main-gay* K.D. 1459!, 1462!, 1463!; at Merliman and Sungei Hudang, *Derry* 466!; at Bukit Bruang, *Goodenough* 1344!. SINGAPORE: *Hullett* 78!; *T. Anderson* 191!; *Kurz*!; *King's Collector* 238!, 1216!; *Cantley* 49!; *Ridley* in various places, 3392!, 3861!, 4682!, 5199!, 14143!. Vern. 'Berangan Papan' (*Ridley*).

8. *CASTANOPSIS SUMATRANA*, A. DC. in Seem. Journ. Bot. for 1863, 182. A large tree reaching 24-30 m. in height and 60-90 cm. in diam. of stem, branches spreading; branchlets stout, dark brown with many prominent pale lenticels, the ultimate ones glabrous or scantily and deciduously puberulous; leafbuds lanceolate, perulate, the scales lanceolate, spreading. *Leaves* chartaceous or thinly coriaceous, very variable in size; oblong-lanceolate or -oblan-

ceolate, sometimes elliptic-oblong, shortly acuminate at apex, or sometimes nearly obtuse, acuminate acute or almost rounded at base; dark green when fresh, olive-green when dry, glabrous on both surfaces; margins entire; 8—25 cm. long, 3—10 cm. broad; midrib moderately stout, raised on both surfaces; main nerves 12—20 pairs, thin but prominent and raised on both surfaces, curving slightly to near the margin then rather abruptly to break up along it in small loops; transverse nervules very many, often branched or irregular, enclosing the areolate reticulation; petiole 1.5—2 cm. long, swollen at base. *Spikes* slender, about 10—15 cm. long, cinereous-pubescent, in long-peduncled terminal or axillary panicles, ♂ very many, ♀ few, some androgynous the ♀ below the ♂ above, sometimes the ♀ from the past year's wood with stout rhachises, showing late development. *Flowers*: ♂ solitary or in clusters of few together; bracteole small, ovate, obtuse; perianthlobes 6, free, ovate-obtuse, very small, villous; stamens 12, with slender filaments and minute globose anthers; pistillode very villous, pale, sometimes small: ♀ in groups of usually 3, bracteoles 1 or more as in ♂; perianth as in ♂ but even smaller; staminodes like minute stamens; styles 3, spreading, villous at base. *Fruits* in thick woody spikes reaching to 20 and even 25 cm. long, when quite young depressed globose with prominent tubercles and more or less pedicelled, when older more or less lobed and constricted, the tubercles flatter, the pedicel less, when mature obovoid or globose, almost sessile, usually slightly constricted in 2—3 lobes, up to 2 cm. high, 3 cm. long and 2—2.5 cm. broad; cupule thick-walled, brittle, minutely grey-pubescent, bearing externally 3—5 irregular transverse rows or groups of short pyramidal tubercles, dehiscence irregular or not at all; ripe nuts 1—3, when 1 ovoid, when more ovoid-complanate, appressed sericeous except the rugose base which occupies one-third of the whole. A. DC. Prodr. XVI. ii. 113; Hook f. Fl. Br. Ind. V. 623; King Ann. Calc. II. 103, t. 97; Brandis Ind. Trees 635. *Castanea inermis*, Lindl. in Wall. Pl. As. Rar. ii. 6; Cat. 2762; A. DC. l.c. 116; Kurz For. Fl. ii. 481. *C. glomerata*, Blume Mus. Bot. Lugd.-Bat. I. 283. *Quercus?* *glomerata*, Wall. Cat. 2791 (not of Roxb.). *Callaeocarpus sumatrana*, Miq. Pl. Jungh. 13, Fl. Ind. Bat. I. i. 868, Suppl. 353 and Ann. Mus. Lugd.-Bat. I. 118.

PENANG: Wallich 2791!; Curtis 1563!, 2968!; King's Collector 1624!. PERAK: Scortechini 167!; at Gapis, Vern. 'Buah Brangan,' Wray 811!; at Batu Togoh, 60 m. alt. Wray 2168!; at various

places and at various elevations up to 300 m., *King's Collector* 2041!, 2299!, 2586!, 3098!, 3788!, 4495!, 4695!, 4835!, 5382!, 5462!, 5510!, 5812!, 5941!, 6782!, 7378!, 7971!, 10301!, 10903!. MAL-
ACCA: *Griffith* K.D. 4442!, 4470!; *Maingay* K.D. 1457!; at *Brisu*,
Derry 28!. SINGAPORE: *Ayer Panas*, *Wallich* 2762!.—DISTRIB.
Burma, Sumatra, Lingya, Borneo.

9. *CASTANOPSIS MEGACARPA*, Gamble in Kew Bull. 180 (1914).
A large tree reaching 12—18 m. in height and 60—90 cm. in diam.
of stem; branches spreading, pendulous; branchlets moderately
stout with dark brown bark and very small lenticels; uppermost
ones minutely tawny velvety; leaf-buds ovoid, the scales lanceolate,
tawny-velvety. *Leaves* coriaceous; oblong or elliptic-oblong or
elliptic, shortly cuspidate-acuminate at apex, acute or rounded
sometimes unequally at base; upper surface glabrous, olive-brown
when dry, shining, lower minutely fulvous- or cinnamomeous-pubes-
cent; margin entire, recurved; variable in size from 8—14 cm. long
by 3—4 cm. broad to 16—24 cm. long by 5—9 cm. broad; midrib
moderately stout, raised on both surfaces; main nerves 12—16
pairs, parallel, slightly raised above, prominent beneath, very
slightly curved to close to the margin and then abruptly curved to
fade away closely along it; transverse nervules many, subparallel,
rather faint, enclosing the obscure areolate reticulation; petiole
1.5—2.5 cm. long, swollen at base. *Spikes* slender, up to 20 cm. long,
in loose terminal or axillary panicles, chiefly ♂, the ♀ apparently
scarce; rhachis slender, angular, furfuraceous. *Flowers*: ♂ in
clusters of usually 3—5 in the axil of an ovate-acuminate pubescent
bracteole about 1 mm. long; perianth-lobes 6, nearly free, obovoid,
villous, about 1 mm. long; stamens 12 with rather short slender
filaments and small globose anthers; pistillode rather small, very
villous: ♀ not known. *Fruits* globose, when mature reaching 5—6
cm. in diam., in rather slender spikes with the rhachis 5 mm. in
diam.; cupule very thick-walled (1 cm. at the base, 5 mm. in the
middle) the walls granular, hard; covered, except an oblong patch
on the inside, with scattered tubercles forming thick stalks from the
summit of which radiate simple or staghorn-like branched slender
subulate spines, usually 1—1.5 cm. long and minutely stellate-
pubescent except at the tips, nearly glabrous at length; nut 1,
closely adherent to the cupule, only the umbo protruded from a
small orifice; seed ovoid, 2.5 cm. long, 2 cm. in diam. the testa thin
and closely pubescent; cotyledons sinuate. *C. javanica*, Hook. f. in

Fl. Br. Ind. V. 620 (not of A. DC.); King Ann. Calc. II. 97, t. 88; both in part only.

PERAK: at various altitudes up to 600 m. alt., Larut and Kinta, *King's Collector* 3488!, 3939!, 6386!, 6469!, 6522!, 7070!. MALACCA: *Maingay* K.D. 1459/3!; at Ayer Panas, *Goodenough* 1316!; at Sungei Udang, Vern. 'Kazu Sabilek', *Derry* 1093!. SINGAPORE: at Bukit Timah, *Ridley* 5118!; in garden jungle, *Ridley* 6683!, 6894!; *Cantley* 25!. Vern. 'Berangan Gajah', 'Kata Bileh Sebdok' (*Ridley*).

The following specimens, *Maingay* K.D. 1459/2 from Malacca; *Curtis* 2492 also from Malacca and *Ridley* 7023 from Province Wellesley, come near this species, but differ in having thinner leaves which are hardly at all cinnamomeous on the lower surface. They may belong to a new species, but ripe fruit would be necessary before a description can be written. Von Seemen has identified *Maingay's* specimens with *C. Hullettii*, but I cannot agree in this.

10. *CASTANOPSIS RIDLEYI*, Gamble in Kew Bull. 180 (1914). A large tree reaching 18—24 m. in height and 60—90 cm. in diam. of stem; branches spreading; branchlets slender, with dark brown bark and many rounded pale lenticels, ultimate ones puberulous; leaf-buds ovoid, the scales lanceolate, tawny-pubescent. *Leaves* coriaceous; lanceolate, shortly acuminate and mucronate at apex, acute or rounded, usually unequally, at base; upper surface glabrous, shining, dark olive-brown when dry, lower somewhat glaucescent, minutely puberulous; margin entire, recurved; 6—13 cm. long, 3—5 cm. broad; midrib slender, slightly impressed above, prominent beneath; main nerves 10—14 pairs, parallel, slightly raised above, straight almost to the margin and there sharply curved along it; transverse nervules close, parallel, branched, enclosing the areolate reticulation; petiole slender, 1—1.5 cm. long. *Spikes* and *flowers* not known. *Fruits* oblong or globose-oblong, 3 cm. long, 2—3 cm. in diam., in slender spikes about 10—12 cm. long, the rhachis scarcely 2 mm. in diam.; cupule crustaceous, granular, brittle, 3 mm. thick; glabrous or slightly tawny-puberulous, covered with distant usually stalked tufts of slender branching curved or straight staghorn-like spines 8—10 mm. long arranged more or less in oblique bands, the spines except their extreme tips covered with scattered strigose stellate tawny-pubescent; nut 1, ovoid-oblong, 2.5 cm. long, adherent to the cupule, the umbo exsert; seed oblong, obtuse, the testa thin, sericeous; cotyledons irregular.

PERAK: on low ground, *King's Collector* 6831!. MALACCA: at Sungei Udang, *Goodenough* 1479!.

11. *CASTANOPSIS WALLICHII*, King in Hook. f. Fl. Br. Ind. V. 624 (1888). A tree, reaching 12—15 m. in height and 40—60 cm. in diam. of stem; branchlets slender, darkly lenticellate, with dark greyish-brown rough bark, the ultimate ones and inflorescence covered with minute cinereous subflocculent pubescence; leaf-buds very small, ovoid. *Leaves* chartaceous; lanceolate or ovate-lanceolate, shortly acuminate often mucronate at apex, acute often unequally at base; upper surface glabrous, olive-brown when dry, lower minutely cinereous- or ferrugineous-pubescent; margin entire, often recurved; 5—9 cm. long, 2—4 cm. broad; midrib slender, impressed above, pubescent beneath; main nerves 6—10 pairs, thin, slightly prominent beneath; transverse nervules few and, with the reticulation, irregular; petiole slender, 6—10 mm. long. *Spikes* slender, up to about 10 cm. long, in terminal or subterminal cinereous-pubescent panicles, ♂ or (rarely ?) ♀ or androgynous the ♂ above the ♀ below. *Flowers*: ♂ in clusters, bracteole lanceolate, villous; perianth-lobes 6, unequal, nearly free, villous; stamens 12 with slender filaments and minute globose anthers: ♀ with rugose cupule and minute styles. *Fruits* sessile, obovoid-hemispheric, flattened on the inner side and slightly curved inwards, 3—3.5 cm. in diam., in very stout spikes up to about 10 cm. long; rachis very thick with dark rough bark; cupule when mature thick-walled densely covered on the rounded surface with stout flat triangular curved sharp spines about 7—9 mm. long, smooth or raised on the flattened surface, enclosing the whole of the single nut which is more or less adherent to the cupule; nut depressed-globose, fulvous-pubescent; cotyledons sinuate. King Ann. Calc. II. 106, t. 101 A. *Castanea Tungurrit*, Wall. Cat. 2763 (not of Blume).

PENANG: on Convalescent Hill, *Wallich* 2763!; in open forest at 300—450 m. alt, *King's Collector* 4848!; on Government Hill, *Curtis* 416!, *Fox* 10646!. MALACCA: *Griffith* K.D. 4444!; *Maingay* K.D. 1465!. SINGAPORE: at Bukit Timah, Changi and in garden forest, *Ridley* 3390!, 3959!, 5567!; *Cantley* 34!.

12. *CASTANOPSIS NEPHELOIDES*, King in Hook. f. Fl. Br. Ind. V. 624 (1888). A tree reaching a height of 12—18 m. and 40—60 cm. in diam. of stem; branches spreading; branchlets slender with dark greyish-brown to nearly black bark, slightly puberulous and with few lenticels, the ultimate ones and inflorescence covered with fulvous furfuraceous tomentum; leaf-buds ovoid, perulate, about 4 mm. in diam., the fulvous scales ovate acute. *Leaves* chartaceous;

elliptic or elliptic-oblong or slightly ovate, shortly and obtusely acuminate at apex, acute or somewhat cuneate at base; upper surface glabrous, bright green when fresh, olive-green when dry, lower silvery-grey when fresh, when dry minutely and sparsely furfuraceous-pubescent; margin entire; 9–14 cm. long, 4–6 cm. broad; midrib slender, slightly keeled above; main nerves 9–12 pairs, slender, prominent beneath, parallel, straight at first, curved near the margin to break up in diminishing loops; transverse nervules many, prominent, enclosing the areolate reticulation; petiole 6–10 mm. long, channelled above. *Spikes* slender, up to 15 cm. long, in lax minutely fulvous-tomentose terminal leafless panicles up to 20–25 cm. long, ♂ and ♀ mixed the latter usually uppermost, sometimes androgynous the ♀ below. *Flowers*: ♂ in clusters, somewhat distant below, closer above; bracteoles minute, ovate; perianth-lobes 6, ovate, acute, often unequal, nearly free, villous; stamens 12 with long filaments and small globose anthers; pistillode rather small, villous: ♀ solitary, distant, bract ovate-obtuse, bracteoles 2–3; cupule densely villous; perianth as in ♂ but smaller; styles 3, short. *Fruits* obovoid, flattened on the inner side and often curved, 2.5 cm. in diam., in spikes up to about 15 cm. long; rhachis like the branchlets; cupule when mature reaching 5–6 mm. in thickness, enclosing the whole of the single nut, except the small umbo and persistent stigmas, the outer surface covered except on the flattened side with short pyramidal, angular, fulvous-pubescent tubercles which are more prominent in immature specimens than in mature ones in which they are scarcely more than short ridges; nut adherent to the cupule; seed with thin brown testa and sinuate cotyledons. King in Ann. Calc. II. t. 102.

PERAK: in various places in forest up to about 200 m. alt., *King's Collector* 3843!, 4740!, 5542!, 6417!, 6423!, 6453!, 6518!, 7208!, 7231!, 7235!, 7835!, 7991!, 8624!, 10589!, 10838!; *Scortechini* 1153!. MALACCA: at Brisu, *Derry* 597!. SINGAPORE: at Bukit Timah, *Ridley* 6440!. Vern. 'Resak' (*Ridley*).

13. *CASTANOPSIS CURTISII*, King in Ann. R. Bot. Gard. Calc. II. 107, t. 103 (1889). A tree reaching 20 m. in height; branchlets slender, glabrous, minutely lenticellate, with bark nearly black when dry; leaf-buds small, oblong-lanceolate with lanceolate acuminate minutely grey sericeous scales. *Leaves* chartaceous; lanceolate or oblanceolate; cuspidate-acuminate, usually rather abruptly, at apex, acute and often unequal at base; both surfaces glabrous,

dark brown when dry, the upper shining, the lower dull, minutely appressed-puberulous on the midrib; margins entire; 7—14 cm. long, 3—5.5 cm. broad; midrib slender, raised on both surfaces; main nerves 10—12 pairs, thin, prominent, subparallel, curving gently to near the margin and then somewhat abruptly along it; transverse nervules many, often branched, somewhat prominent, enclosing the areolate reticulation; petiole slender, 7—9 mm. long. *Spikes* and ♂ *flowers* not known; ♀ with spreading ovate perianthlobes and 3 cylindric styles. *Fruits* solitary, pyriform, 2.5 cm. in diam., the upper side flattened, the apex excentric just above it, in stout lateral racemes about 10 cm. long; pedicel thickened, 8—10 mm. long, 5 mm. thick; cupule moderately thick, minutely cinereous-tomentose, marked with short interrupted vertical ridges, when very young obovoid prominently tawny-villous and tubercular, deflexed; pericarp of nut adherent within to the cupule, the umbo and remains of stigmas alone exsert, its inner surface tawny-villous; seed with thin rugose testa and sinuate cotyledons.

PENANG: at Penara Bukit, etc., at about 300 m. altitude, *Curtis* 1691!; Government Hill at about 450 m. alt. *Curtis* 3934!

Ridley 10071 from Kwala Pedas, Negri Sembilan has been identified by A. von Seemen in the Kew Herbarium as being probably *Castanopsis echidnocarpa*, A. DC. The material is so poor that I have thought it best not to include it in the key and descriptions.

In his paper on the Flora of the Telöm and Batang Padang Valleys in the Journ. Fed. Malay States Museum, vol. iv, page 63 (1909), *Ridley* mentions the finding of *Castanopsis argentea*, A. DC. His specimen is in the Kew Herbarium, in young fruit only, and seems to me to come nearer to *C. Hystrix* A. DC., but, to properly identify species of *Castanopsis* ripe fruit is indispensable.

Family CXVI. SALICACEÆ.

Deciduous trees or shrubs. *Leaves* alternate, petiolate, stipules free. *Flowers* diœcious, in catkins, each bract with one flower, bracteoles 0. *Perianth* 0. *Disk* of one or more scales or glands or cup-shaped. *Stamens* 2 or more; filaments free or connate; anthers ovate orbicular or oblong, dehiscence longitudinal. *Ovary* sessile or stipitate, 1-celled; ovules few or many on 2—4 subbasal or parietal placentas, erect, anatropous; style short or 0; stigmas short, notched or lobed. *Fruit* an ovoid or lanceolate 2—4-valved capsule. *Seeds* few or many, funicle with a pencil of long silky hairs; albumen 0; cotyledons plano-convex; radicle short, inferior. —DISTRIB. Genera 2, chiefly in N. temperate regions.

1. SALIX, Linn.

Trees or shrubs, sometimes small or prostrate. *Leaves* usually narrow, penninerved, petioles short. *Flowers* usually in erect catkins; bracts small; disk of 1 or 2 separate scales. *Stamens* 2, rarely 3 or more, anthers small, filaments filiform. *Ovary* sessile or stalked; placentas 2; ovules few, 2-seriate on each placenta, usually 4—8. *Fruit* a 2-valved capsule — *DISTRIB.* Species about 160 with innumerable varieties and hybrids, mostly of the Northern Hemisphere, very few tropical.

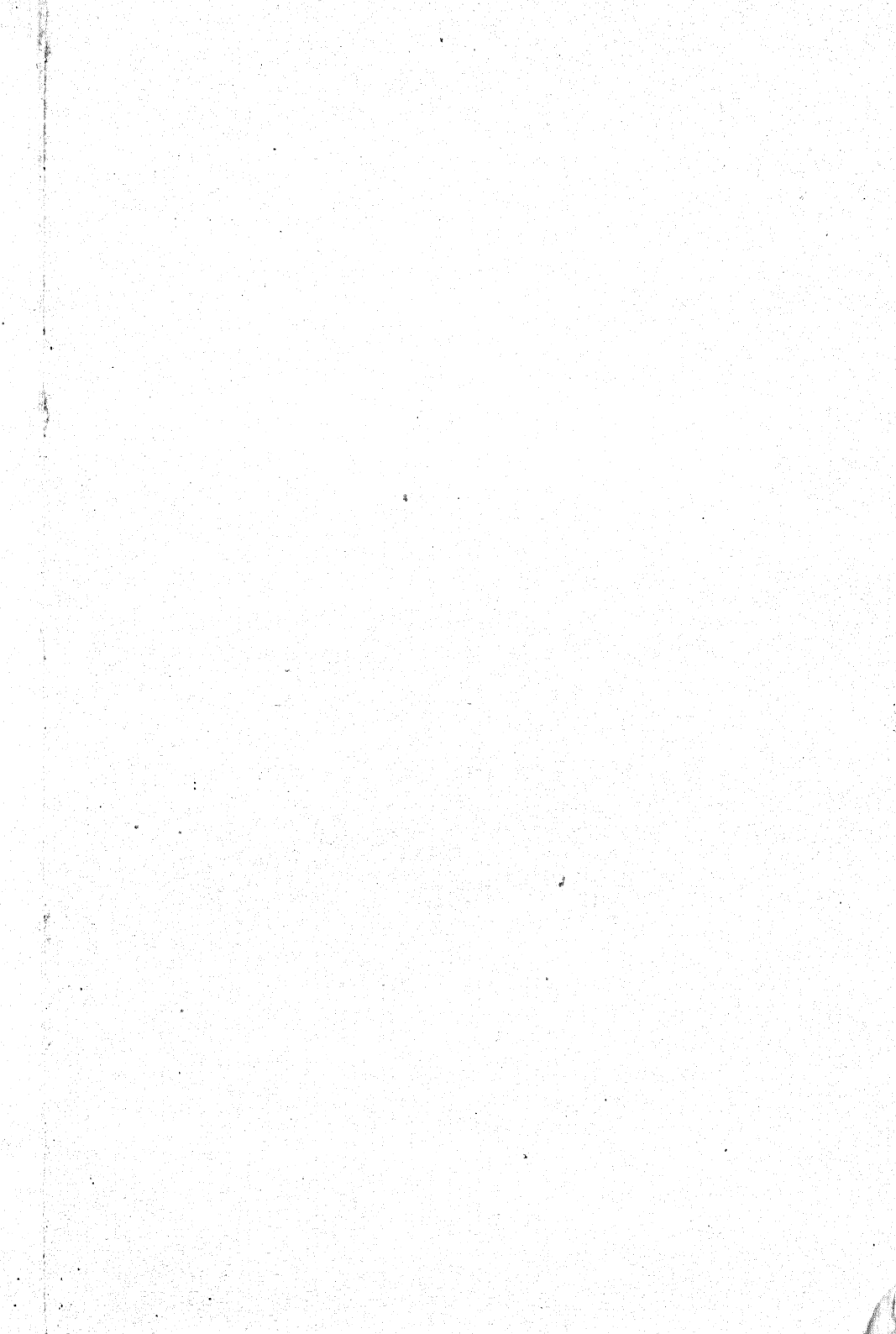
SALIX TETRASPERMA, Roxb. Cor. Pl. I. 66, t. 97 (1795). A small tree reaching a height of 12 m., trunk up to 3 m. in girth; bark rough; branches suberect; branchlets purplish-brown, smooth. *Leaves* submembranous; ovate-lanceolate or linear-lanceolate, long acuminate at apex, attenuate or rounded at base, sometimes unequally; green and glabrous above nearly black when dry, white and when young more or less silky beneath; margins entire or serrulate; 5—20 cm. long, and 2—5 cm. broad; midrib fairly prominent; main nerves 10—20 pairs, curving to and along the margin and then joining in diminishing loops; secondary nerves many and prominent, between the main nerves, branching and enclosing the areolate reticulation; petiole slender, 1.5—2 cm. long; stipules subulate, deciduous. *Flowers* appearing after the leaves: ♂ in slender usually lateral villous catkins up to 12 cm. long, more or less leafy at base, sessile, single or clustered; bracts ovate, obtuse, silky-villous, under 1 mm. long; disk of 2 glands the outer one larger and obtuse: ♀ in shorter catkins, pedicellate; bracts obovate-oblong, acute, villous; disk of one clasping cup-shaped basal gland. *Stamens* 5—10; filaments free, slender, 2—2.5 mm. long; anthers small, orbicular. *Ovary* fusiform, glabrous; ovules usually 4; stigma sessile, 2-lobed, each lobe again divided. *Capsule* glabrous, ovoid, about 3 mm. long, the 2 valves reflexed, stalk slender about 4 mm. long. *Seeds* 4—6, the funicle silky-penicillate; cotyledons oblong. Roxb. Fl. Ind. III. 753; Willd. Sp. Pl. III. 657; Anderss. Monog. 1, fig. 1 and in DC. Prodr. XVI. ii. 192; Wight Ic. t. 1954; Brandis For. Fl. 462, t. 58 and Ind. Trees 636; Kurz For. Fl. II. 493; Bedd. Fl. Sylv. t. 302 ♂ branch only; Wall. Cat. 3700 A in part, 3700 E, 3707, 9104, 9106; Dalz. and Gibs. Bomb. Fl. 220; Miq. Fl. Ind. Bat. I. ii. 460; Hook. f. in Fl. Br. Ind. V. 626; Cooke Fl. Bomb. II. 662; Prain Beng. Plants 989; Koord. Exkurs. Fl. Jav II

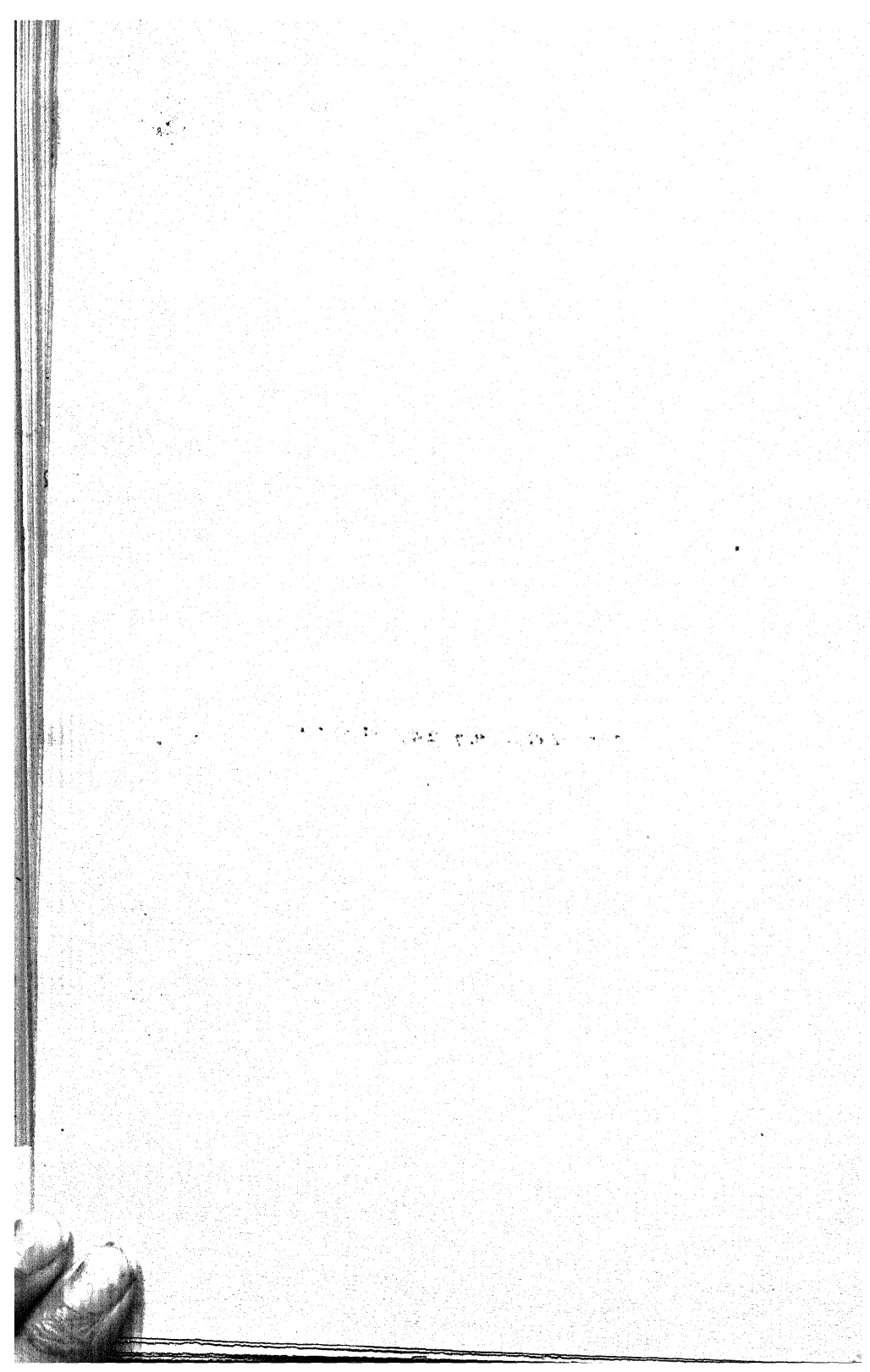
44. *S. disperma*, Don Prodr. 58; Anderss. in Act. Holm. (1850) 500 and in Journ. Linn. Soc. V. 42. *S. Horsfieldiana*, Miq. l c. 461.

PENANG: at Batu Phunghie and Ayer Etam, *Curtis* 698!; at Balik Pulau, *Ridley* 9406!. PERAK: on open low ground generally near water, Larut, *King's Collector* 1987!; at Ulu Temango, *Ridley* 14495!; at Pluss river *Wray* 546!. PAHANG: at Pekan, *Ridley*!. SELANGOR: at Bukit Kutu, *Ridley* 10543!; at Weld's Hill, *Burn-Murdoch* 8!. MALACCA: Machope Forest at sea-level, *Maingay* K.D. 1466!; *Griffith*!; *Hervey*!; at Bukit Jus *Derry* 929!; at Batang Malaka, *Holmberg* 849!; at Bukit Senggah, Vern. "Dahoo" *Good-enough* 1404!.—DISTRIB. India, China, Malay Archipelago.

Among the specimens from the Malay Peninsula in the Herbaria of Kew, Calcutta and Singapore, I have found none of the flowers of the female plant, so the description of them is taken from Indian specimens. Most of the available material agrees closely with the specimens of *S. Horsfieldiana*. Miq. of Java, as might be expected.

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